W. A. Gibson.

THE CHAUTAUQUAN

JUNE, 1881.

A MONTHLY MAGAZINE DEVOTED TO THE PROMOTION OF TRUE CULTURE.
ORGAN OF THE CHAUTAUQUA LITERARY AND SCIENTIFIC CIRCLE.

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THEODORE L. FLOOD, A. M., Editor.

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REQUIRED READING.

HISTORY OF THE WORLD.

CHAPTER LI.

THE CRUSADES—A. D. 1096–1291.

THE FIRST CRUSADE.

The Turkish captors of Jerusalem proved to be insufferably insolent and oppressive to the Christian pilgrims who flocked thither to worship at the sepulchre of Christ. Peter of Amiens, the hermit, resolved to call the warlike nations of Europe to arms, drive the Moslems out of Palestine, and convert it into a Christian kingdom. He was a small, keen-eyed, eloquent fanatic. "Whatever he wished he believed, whatever he believed he *saw* in dreams and revelations." He returned to Europe to execute his design, received the support of Pope Urban II, and with bare head, naked feet, coarse garment, and weighty crucifix, preached with such power as to rouse all Italy and France to the great undertaking.

In 1095 it was formally inaugurated at the Council of Clermont in France. In response to the stirring address of the Pontiff, cries of "*Deus vult*" (God wills it) burst from the assembled multitudes. "*Deus Vult*" became the war-cry of the adventurers, each of whom bore upon his clothing or armor the sign of the cross. Hence the name of *Crusade* (French *Croisade*, from the Latin *Crux*, a cross). Vast numbers from all parts of Europe hastened to engage in the holy war. Over six millions of men, sooner or later, took the Crusader's vow. *Plenary indulgence* was promised to all who should enlist under the banner of the cross; also "the absolution of all their sins, and a full receipt for all that might be due of canonical penance." If they should fall in battle they were told that it would be as martyrs; and if they survived it would be in certainty of heavenly reward. The love of war, adventure, and freedom added its impulse to that of religious excitement.

In May, 1096, twenty thousand eager crusaders set out for the Holy Land, under the command of Walter the Penniless. Only a few of the number—Walter included—reached Constantinople. The rest perished on the way. Forty thousand men, women, and children next followed, under the guidance of Peter the Hermit. Greatly reduced in numbers, they reached Constantinople, united with the followers of Walter, and were nearly all slain by the Turks on the plain of Nice in Bithynia. Fifteen thousand Germans, led in their crusade by a priest named Godescal, were slaughtered in Hungary, as was also a fourth and following horde of 200,000 wretches from France, England and Flanders, who committed horrible ravages, and who murdered and pillaged the Jews without mercy. Three hundred thousand crusaders perished before a single city was wrested from the infidels. These were only the foam in advance of the wave. The real crusaders consisting of the nobles, yeomanry, and serfs of Europe, under feudal leaders of the first rank and fame, followed. Six armies appeared in the field at intervals, and united their forces at the Capital of the Greek empire, to the number of 600,000 men, besides women and priests. Every knight in the vast host had sworn to perform the duties of his profession. "As the champion of God and the ladies, he devoted himself to speak the truth; to maintain the right; to protect the distressed; to practice courtesy; to pursue the infidels; to despise the allurements of ease and safety, and to vindicate in every perilous adventure the honor of his character." This was chivalry.

Nice, the capital of Sultan Solyman, was taken in 1097. He was also routed at the battle of Dorylæum. Baldwin, brother of Godfrey of Bouillon, then went into Mesopotamia, and obtained the sovereignty of Edessa. Antioch was taken in June, 1098, and the inhabitants massacred. Godfrey is said to have done some marvellous exploits, such as dividing a Turk from the head downwards with one stroke of his sword, so that "one half of the infidel fell to the ground, while the other was transported by his horse to the city gate." During the siege many of the crusaders fell victims to famine and disease. Some of them lost heart, and deserted the enterprise. Among the latter was Peter the Hermit,—better at preaching than at fasting and fighting—who was brought back by the soldiers of the heroic Tancred, and publicly reprimanded. Scarcely had Antioch been stormed, when 200,000 Moslems, advancing to its relief in turn besieged the captors. The choice of servitude or death was offered by the commander, Kerboga; but the enfeebled Crusaders declined both, and in a memorable battle annihilated or dispersed the assailants.

The way to Jerusalem was now open, and in the summer of 1099, forty thousand heroes, the sad remnant of the once mighty host, caught sight of the holy city. On the 15th of July, "on a Friday, at three in the afternoon, the day and hour of the passion, Godfrey of Bouillon stood victorious on the walls of Jerusalem." Seventy thousand Moslems were put to the sword, many of the Jews were burnt in their synagogue, and then the victors accomplished their vow. "Bareheaded and barefooted, with contrite hearts, and in an humble posture, they ascended the hill of Calvary, amidst the loud anthems of the clergy; kissed the stone which had covered the Saviour of the world; and bedewed with tears of joy and penitence the monument of their redemption." (*Gibbon's History of the Decline and Fall of the Roman Empire. Vol. v. p.* 594.) They were deeply religious but not truly Christian. Ignorant and superstitious, though sincere and heroic, they failed to understand the spirit and

teachings of their Lord, and to emulate his holy human example. The Greek Christians, and other sectaries soon found out that the Latins were even harder masters than the Moslems.

As the result of the first crusade, the best part of Asia Minor was regained by the Greeks; Baldwin was established at Edessa, Bohemund in the principality of Antioch, and Godfrey in the kingdom of Jerusalem. The latter and his successors extended their rule from Scanderoon to Egypt; from the Mediterranean to the Euphrates;—leaving only four cities in the hands of the Moslems. The Knights of St. John of Jerusalem were their bravest and best supporters.

The Second Crusade.

In 1144 the principality of Edessa fell before the assault of the emir of Mosul, who slaughtered the Christians. His son, Noureddin, then pressed on to destroy the Christian kingdoms of Syria and Palestine. All Europe was roused. The famous St. Bernard, abbot of Clairvaux in France, preached a second crusade. Two enormous armies took the field in 1147, and marched for the Holy Land. Louis VII, of France, commanded one, and Conrad III, emperor of Germany, the other. Their combined forces were estimated at 1,200,000 combatants. But they accomplished next to nothing. The treacherous Greek emperor, Manuel Commenus, did all he could to ruin the enterprise. Conrad's army was betrayed by Greek scouts, and was cut to pieces by the Turks near Iconium; that of Louis was almost destroyed in the defiles of the Pisidian mountains. When the remnants reached Syria, they coöperated with the Christian princes of Antioch and Jerusalem in the siege of Damascus, and subsequently in that of Ascalon, but failed to reduce either stronghold. In 1149 the two monarchs returned to Europe, leaving the bones of a million crusaders to bleach under the Asiatic skies.

The Third Crusade.

In 1187, Salah-Eddin, the sultan of Egypt, a gallant and generous warrior of Kurdish blood, put an end to the kingdom of Jerusalem by the capture of its capital. William, archbishop of Tyre, thereupon became the preacher of the third crusade. The Emperor Frederick I, of Germany, King Philip of France, and King Richard (Cœur de Lion) of England, prepared to respond to the call. The emperor was obliged to fight his way through the hostile Greeks, and lost his life from drowning, or from fever brought on by bathing in a river. Part of his army only arrived in Palestine, and there united with the remains of the army of Jerusalem in the siege of Acre. Philip and Richard arrived by sea, and joined in the siege, which lasted twenty-three months. Jealousies broke out, and Philip forsook the crusade. Richard remained for some time, and performed such prodigies of valor that for many years after "his tremendous name was employed by the Syrian mothers to silence their infants; and if a horse suddenly started from the way, his rider was wont to exclaim, 'Dost thou think King Richard is in that bush?' " He at last agreed to an honorable truce with Saladin, in which "it was stipulated that Jerusalem and the holy sepulchre should be open without tribute or vexation, to the pilgrimage of the Latin Christians."

The Fourth Crusade.

Unwilling to leave Jerusalem in the hands of the Moslems, a fourth crusade was determined upon by Pope Innocent III, in 1203. The armament assembled at Venice, but instead of repairing to Palestine, it besieged Constantinople, placed Baldwin, Count of Flanders, on the throne, and divided the empire between him and the other crusaders. The reconciliation of the Greek and Latin churches was the avowed object of this flagrant injustice, which only widened the breach between them. Venetian commerce received much enlargement from it. A minor crusade was undertaken by Andrew II of Hungary, in 1217, and still another by Count William of Holland, in the same year. Both were unproductive of any lasting result.

The Fifth Crusade.

The fifth crusade was commanded by the Emperor Frederick II, of Germany, and began in 1228. It ended in 1229 by the cession of Palestine to the emperor, who was crowned King of Jerusalem in the same year. After his departure the Christians lived in quiet and prosperity for the brief period of fifteen years.

The Sixth Crusade.

In 1244 the Charismian Turks, a more ruthless and savage race than the Saracens, or the Seljukians, burst into Syria. Jerusalem was pillaged and burnt, and the Latin Christians were once more obliged to resume their task. Louis IX of France, (St. Louis), led 40,000 soldiers against them. Sailing from Cyprus to Egypt, he conquered the coast and town of Damietta, but was soon defeated and taken prisoner by the sultan. Allowed to ransom himself and army, he embarked for Palestine, wasted four years within the walls of Acre, but could not visit Jerusalem, and returned without glory to his native land.

The chief result of this crusade was the establishment of the Mameluke power in Egypt. The Mamelukes were Tartar slaves who composed the sultan's body-guard, and who murdered him, in revenge for his politic generosity to King Louis. They then elevated their own commander to the throne.

The Seventh Crusade.

After the return of St. Louis to France, the Mamelukes of Egypt conquered the greater part of the Christian possessions in Palestine. This prompted him to undertake the last crusade. The hope of baptizing the king of Tunis, tempted him to steer for the African coast, where he and the greater part of his army died of pestilence in 1270. Prince Edward of England, afterwards Edward I, then assumed command and went to Palestine, but accomplished nothing worthy of note. He was the last of the crusaders. In 1291, Acre, the last of the Syrian fortresses, capitulated to the Moslems, and Palestine was abandoned to their undisturbed possession. All enthusiasm about the holy sepulchre died out in the Western nations, nor could the utmost efforts of the Papacy rekindle it.

The fact was that the crusades had liberated, in some measure, the mind of Europe from superstition and bigotry; they had brought the soldiers of the cross into contact with a civilization far superior to their own; they had exposed the motives, the policy, and the character of the Papal court, and had subjected it to a freedom of criticism that subsequently issued in the Reformation. The church and the crown had increased in power and splendor; cities had grown in wealth and influence; and both in city and country personal liberty had made enormous strides. The commerce of the Mediterranean and Black Seas fell into the hands of the Italian republics of Venice, Genoa, and Pisa. As mind in Europe was awakened and quickened by the crusading enthusiasm, so it was enriched by better acquaintance with the philosophical and theological literature of the Greek Christians and the Moslems. Classical studies revived, and the science and arts of the Arabs were introduced to the Western nations.

The fanaticism which vented itself in the Crusades also wrought unmixed evil in its sanguinary persecutions of the Cathari, Albigenses, Waldenses, and other sects in Europe. It was as blind and bitter, as brutal and bloody against the truth as against error; against Christ in the persons of His holiest disciples, as against Mohammed in the persons of his fiercest and worst adherents.

SYNCHRONOLOGY, A. D. 1000–1291.

THE CRUSADES.

(Hawes's Synchronology).
Jerusalem captured by the Turks, 1065.
Christian pilgrims outraged by the Turks, 1087.
Preaching of Peter—Council of Clermont, 1095.
The First Crusade, 1096.
The Second Crusade, 1147.
Saladin takes Jerusalem, 1187.
Third Crusade, 1188.
Fourth Crusade, 1203.
Fifth Crusade, 1217.
Sixth Crusade, 1228.
Seventh Crusade, by some historians reckoned the Fifth, 1248.
Eighth Crusade, 1270.
Ptolemais taken by the Turks. Crusades end,—having cost the lives of two millions of men, 1291.

70,000 Europeans killed or made prisoners by the Turks in Palestine, 1062.
Harold, king of England, slain at Hastings, 1066.
Saracens in Spain call in the aid of the Moors, 1091.
Edgar puts out the eyes of Donald, king of Scotland, and dethrones him, 1098.
William of Poitou, the first troubadour, 1100.
Henry V of Germany, excommunicated by Pope Pascal I, 1106.
Alphonsus, assisted by the Crusaders, rescues Lisbon from the Moors, 1147.
Massacre of the Jews at the coronation of Richard I of England, 1189.
Greek empire divided into four parts, 1204.
Asia overrun by the hordes of Genghis-Khan, 1216.
Inquisition established at Toulouse in France. The Scriptures forbidden to all laymen, 1229.
Haco, king of Norway, repulsed from the Scottish isles, 1249.
Cathedral of Notre Dame built at Paris, 1270.
Marco Polo travels to Pekin in China, 1272.
The Papal Chair empty for two years and three months, 1292.
Regular succession of English Parliaments from 1293.
Tallow candles a luxury. Splinters of wood used for lights, 1298.
Spectacles invented, 1299.

CHAPTER LII.

GREAT BRITAIN AND IRELAND—A. D. 449–1485.

After the abandonment of Britain by the Romans, the inhabitants were grievously harassed by the incursions of the barbaric Picts and Scots. Unable to defend themselves against the invaders, the Britains sought the aid of the Jutes, a band of whom, under Hengist and Horsa, landed at Ebbs Fleet in 449, and quickly put the northern savages to flight.

The new allies soon proved themselves to be more dangerous than the ancient foes, and forcibly established themselves in the country. Fresh bands of their brethren followed. Angles, Saxons, and Jutes from Germany and Denmark poured into the island in streams, drove out the natives, and planted themselves—together with their heathen worship, political institutions, and warlike habits—in the room of their rightful owners. "Foes are they," said a Roman poet, "fierce beyond other foes, and cunning as they are fierce; the sea is their school of war, and the storm their friend; they are sea-wolves that prey on the pillage of the world." So thoroughly did they conquer the land that "not a Briton remained as subject or slave on English ground." Though stubborn and valiant fighters, all the Britons were either slain or driven into the mountains of Wales. Germany transplanted part of itself into Britain, and the transplanted portion remained German in language, law, usage, and religion. "In its village Morts," writes the eloquent historian of the English people, "lay our Parliament; in the gleeman of its village feasts our Chaucer and our Shakspere; in the pirate bark stealing from creek to creek our Drakes and our Nelsons."

When the Britons were all expelled from the east and centre of England, the new-comers indulged their passion for war by ceaseless fights among themselves. Each petty kingdom waged merciless war upon its neighbors, and sold its captives into slavery. Some of them were exposed for sale in the market place of Rome. "Their white bodies, their fair faces, their golden hair was noted by a deacon who passed by. 'From what country do these slaves come?' Gregory asked the trader who brought them. The slaveholder answered: 'They are English,' or, as the word ran in the Latin form it would bear at Rome, 'they are Angles.' The deacon's pity veiled itself in poetic humor; 'Not Angles but Angels,' he said, 'with faces so angel-like! From what country came they?' 'They came,' said the merchant, 'from Deira.' *'De ira!'* was the untranslatable word-play of the vivacious Roman—'aye, plucked from God's ire and called to God's mercy! And what is the name of their king?' They told him 'Ælla,' and Gregory seized on the word as of good omen. 'Alleluia shall be sung in Ælla's land,' he said, and passed on, musing how the angel faces should be brought to sing it." In 597 he sent Augustine with a band of monks to preach the Gospel to the English people. The soldiers of the cross landed on the spot where Hengist had landed over a century before. Ethelbert, the Kentish king, accepted the Gospel, which gradually spread into the neighboring principalities.

Northern England was evangelized by missionaries from Ireland. The Germanic tribes constituted a broad bar of heathen darkness that shut out the Gospel light from the eastern part of the island. All Britain was Christian before they came, but Christianity had retired before their savagery. Wales and Ireland remained Christian. Ireland, especially, was the home of science and Biblical knowledge, and also of missionary zeal. Columba, an Irish refugee, established the famous mission station at Iona, on the west coast of Scotland; and from it went out Aidan, who fixed his bishop's see at Lindisfarne, and from thence itinerated on foot among the peasants of Northumbria and Yorkshire, preaching the glad news of salvation by Christ. The abbot of Iona was the spiritual head of the church in the north of England, and the Pope of Rome in the south. The influence of the Irish scholars was felt by Bede, "the father of English learning," and the translator of the Gospel according to John into the English tongue. Six hundred scholars gathered round him, and spread the circle of his benign power. He died chanting "Glory to God."

The Saxon kingdoms of Kent, Sussex, Wessex, Essex, Northumbria, East Anglia, and Mercia were at last driven into union under king Egbert by the irruptions of the heathen Danes, about the beginning of the ninth century. Toward its close they were in possession of most of the country, but were at length subdued by Alfred, whose genius, abilities, culture, genuine piety, and brilliant achievements justly entitle him to the epithet of the "Great." "So long as I have lived," he said, when dying, "I have striven to live worthily." His name is still familiar and precious to every English child. He was an author, translator, legislator, and organizer. In all things he was guided by the spirit, and in many things by the letter of the Bible. The system of town meetings, county boards of supervisors, state legislatures, and the national congress are all outgrowths of the "wise-moots," or assemblies of the wise, in England. The Witanagemote was the national congress or parliament which elected or deposed kings, administered higher justice, imposed taxes, made laws, declared wars, concluded treaties, disposed of public lands, and appointed the great officers of state.

In 991, the Norwegians assailed England. The Danes next resumed aggression, and gave monarchs to the people in the persons of Canute and his successors. Canute became a Christian, "vowed to God to lead a right life in all things," and manfully tried to keep his vow. The Danish kings were followed by the Saxon Edward the Confessor, whose "good laws" were so dear to the people that liberty and independence were afterwards and always associated with his name. William the Conqueror believed himself to be the chosen nominee of this ideal monarch for the succession to the English throne, and claimed the right to present himself to the nation as a candidate. The opportunity was denied him by the election of Harold, immediately after the death of the Confessor in 1066. He resolved to assert his right by force

of arms, and while Harold was occupied with the invading Norwegians, whom he overthrew at Stamford Bridge, William landed with an army of Normans and Bretons at Pevensey in Sussex. Harold hastened to meet him. The two armies met at Senlac, near Hastings. The English warriors stubbornly contested the ground, and repeatedly drove back the Normans. A feigned flight of the latter broke the impregnable shield-wall of the English, who burst into pursuit. The Norman Duke then turned upon his disorderly pursuers, cut them to pieces, and charged upon the hill where Harold and his men fought like wounded lions. At sunset an arrow pierced Harold's right eye, and the battle closed with a desperate melly over his corpse.

Edgar the Ætheling was then chosen king; but he was only a boy, and no match for the Conqueror. He himself headed the deputation that came to offer the crown to the Norman Duke, whom Londoners willingly elected to the throne. William's "soldiers were kept in strict order. No change was made in law or custom." "Peace and order were restored," and he desired to reign as the legitimate successor of the Saxon kings. The discontented English sought refuge in distant lands, and from this time formed a great part of the Varangians or body-guards of the Greek emperors at Constantinople. The national revolt of 1068 transformed the king into a conqueror so ruthless that he swept the country from the Aire to the Tees bare of man and beast. Fifty years later the land lay untilled, and deserted of men for sixty miles to northward of York. Hereward, "the last of the English," made an obstinate and heroic resistance in the fen-country for some years. The last hope of freedom died with him at the surrender of Ely.

The Norman Kings.

Foreign conquest and oppression, on the whole, wrought out good to England. They welded national unity, begot moral and religious revival in the conquered, and made them acquainted with the artistic and intellectual life of the continent. William was a giant in size, possessed enormous strength and desperate bravery, and was as remarkable for the fury of his wrath as for the pitilessness of his revenge. His nature was hard, and only bent in the loneliness of the woods. "He loved the wild deer as though he had been their father." Only a single execution stained his reign. If "stark" to rebel and baron, men noted that he was "mild to those that loved God." Every tenant under the king or his barons was obliged to swear allegiance to the crown. William's commissioners empaneled a jury in each hundred of the realm, which "declared on oath the extent and nature of each estate; the names, number, and condition of its inhabitants; its value before and after the conquest, and the sums due from it to the crown." The inquiries and declarations were all recorded in the Domesday Book. The king held the Papal clergy under a tight rein, and seems to have desired their spiritual efficiency and the religious improvement of his kingdom. He died at Rouen in Normandy, in 1087. The attendants deserted him as he breathed his last, and "the Conqueror's body lay naked and lonely on the floor."

William Rufus, his second son, seated himself in the vacant throne. A fierce and able soldier, but a tyrannical ruler, he was slain, either by accident or design, in the year 1100. Peasants found his dead body in the New Forest, with an arrow sticking in his breast.

Henry I, youngest son of the Conqueror, then seized the sceptre, and confirmed himself in its possession by his grant of a charter that included the "law of Edward," and by his marriage with Matilda, the niece of Edgar Ætheling. By these measures he secured the loyalty of the people, who supported him against his brother Robert, and who conquered the Normans in the decisive battle of Tenchebray in 1106,—thereby avenging on Norman soil the shame of Hastings. Henry as a governor "was a good man, and great was the awe of him." As a man he was cool, able, and methodical. Cruelty, greed, and lust sullied the splendors of his reign. Under him the financial and judicial systems of England had their rise. In 1120 his only son, William the Ætheling, was drowned on the French coast. When the tidings reached him, "stern as he was, Henry fell senseless to the ground, and rose never to smile again." His last years were embittered by the hostile intrigues of Geoffrey of Anjou,—"whose habit of wearing the common broom of Anjou, the *plaxta gemsta*, in his helmet, gave him the title of Plantagenet"—to whom he had given his daughter Matilda, in marriage.

Stephen, Count of Blois, and son of the Conqueror's daughter Adela, was raised to the throne by the suffrages of the Londoners, on the death of Henry I in 1135. He proved to be a temporizing and weak ruler. Yet his subjects loyally sallied to his aid, and at the battle of the Standard, fought at Northallerton, drove the Celtic tribes of Scotland in utter rout from the field. When Matilda, accompanied by the Earl of Gloucester, landed in the country to claim the crown for her son, some of the barons arrayed themselves on her side. In the civil war that ensued the land was filled with horrors. The barons "greatly oppressed the wretched people by making them work at" building "castles, and when they were finished they filled them with devils and armed men," whose atrocious cruelties foreshadowed those of the Spanish Inquisition. The religious labors of the austere Cistercean monks alone gave any promise of future peace. In 1153, Henry, the Duke of Anjou and Normandy, and grandson of Henry I, appeared in England, and was welcomed by thousands. The impending conflict between him and Stephen was averted by the interference of the clergy, who brought about the Treaty of Wallingford, by which Stephen was allowed to retain the crown as long as he lived, and was then to be followed by Henry.

Henry II took the crown on Stephen's death in 1154. He was a short, compact, busy man, "always on his legs from morning till night." Thomas a Becket, was created his Chancellor, and was afterwards raised to the archbishopric of Canterbury. The cleric was quite as willful and tyrannical as the layman. Henry was resolved that all his subjects should be equal before the law, and Becket was resolved that they should not. The clerical order then included not only the priesthood, but also the whole of the professional and educated classes. Every member of these claimed the "benefit of the clergy," that is, exemption from civil jurisdiction. They could be tried only in church courts, and church officials did not inflict any punishment for crimes, except a spiritual one in the shape of penance, or deprivation of orders. Henry proposed that clerical convicts should be punished by the civil power. Becket would not consent. The "customs" of the realm were appealed to, and were embodied in the "Constitutions of Clarendon" by the bishops and barons in 1164. These "Constitutions" restricted the legal power of the clergy. Becket at last consented to set his seal to them, and then retracted his assent. Henry had "initiated the rule of law," but the rebellious ecclesiastic would not submit to it. Henry instituted the system of grand juries, and strove to perfect his legal reforms. Becket's obstinate opposition moved him to furious wrath. Four of his knights silenced that opposition by murdering Becket, and scattering his brains over the floor of the cathedral at Canterbury. The brutal outrage won canonization at once for the unsaintly Becket. Miracles were said to be wrought at his tomb, and he became the most popular of English saints. The state of religion and morality in England at that time may be learned from the "Bishop Goliath" of a court poet, named Walter de Map. He strips the veil from the corruption of the church, and exposes its indolence, avarice, and

immorality to the public gaze. Becket was an unclean specimen of his "order."

Ireland, at this epoch, had seriously retrograded in learning and civilization. It was full of kidnapped Englishmen who were held in slavery. Henry received permission from the Pope to reduce it to order, "and to enforce the payment of Peter's pence." The warring septs or clans were little better than savages. Henry, however, was not allowed to fulfil his commission. Dangers threatened on every side, and to meet them he prostrated himself, in 1174, before the shrine of the martyred Becket, and submitted to a public scourging in expiation of his complicity in the archbishop's murder. For the next ten years his power was at its height. The Scotch king was taken captive; Eleanor, Henry's intractable wife, was imprisoned, and his rebellious sons were reduced to submission. The judicial system of England was perfected, the national militia restored, and preparations made for taking part in a projected crusade against the Saracens. But Richard, his son, again took up arms against him. John, his favorite son, conspired for his destruction. "Now," said the hunted king, as he learned the last heart-breaking fact, "let things go as they will—I care no more for myself or for the world." Muttering, "Shame, shame on a conquered king," he sullenly passed away in 1189.

SYNCHRONOLOGY, 449-1189.

GREAT BRITAIN AND IRELAND.	
Saxons invited into Britain, 449.	Eutyches affirms the existence of only one nature in our Lord Jesus Christ, 447.
Defeated by Prince Arthur and Ambrosius, 487.	Attila, king of the Huns, routed at Chalons, 451.
East Anglia, or Angle-land (whence) England, founded, 575.	Clovis, king of the Franks, baptized 496.
Peter's pence first collected, 727.	The Gemara, or Talmud of Babylon, published, 498.
England united under King Egbert, 827.	Leovigild, king of Spain, 570.
Kenneth McAlpine defeats the Picts, 843.	Gildas, the British historian, writes *cir.* 590.
Alfred the Great, 872.	Chosrols, king of Persia, besieges Rome, 611.
Alfred institutes a regular militia and navy, jury-trial, fairs and markets, 890.	Glass brought into England, 664.
Macbeth murders Duncan in Scotland, 1039.	Whitby Abbey founded, 674.
William the Conqueror, 1066.	Winifred, an Anglo-Saxon, evangelizes the Frisians, 731.
Lanfranc, Archbishop of Canterbury, 1081.	Ramiro I, king of Spain, slays 70,000 Saracens in one battle, 824.
Canon law introduced into England, 1140.	The Normans pillage Rouen, and march to Paris, 840.
Accession of Richard I, 1189.	Iceland settled by the Norwegians, 874.
	Russian expedition under Oleg against Constantinople, 904.
	Patronage of the Papal throne in the hands of harlots, 912.
	Danes defeated at Clontarf in Ireland, 1039.
	Popery claims supreme spiritual and temporal dominion, 1070.
	Norman French taught in the schools, and used in all legal proceedings in England, 1084.
	Dissensions of Guelphs and Ghibellines, 1140.
	Knights of the Teutonic Order instituted, 1190.

CHAPTER LIII.

GREAT BRITAIN AND IRELAND—1189.

The Angevin Kings.

Richard I, successor to his father Henry II, was born in England, but bred in France. He was a stranger to his native land, and only visited it to raise troops and money for the Crusade. In the Holy Land he vindicated his title of "*Cœur de Lion*" (Lion-Heart) by his martial prowess. Troubles in England recalled Richard, but on his overland journey through Germany he was imprisoned by the Emperor, and compelled to accept his English crown as a fief from his jailer. "The devil is loose; take care of yourself," wrote Philip of France to Prince John, his accomplice in England, when he heard of Richard's release. John submitted at once on Richard's arrival, and left the latter at liberty to carry out his schemes in France. He was a brave, stern, defiant, greedy prince, but not without generosity. He was struck down by an arrow shot from the walls of the castle of Chalwz, which he was besieging in 1199. The archer was captured, and magnanimously forgiven by the dying kingly desperado.

John was acknowledged as King in England and Normandy, but in 1204 was stripped of the latter, and of nearly all his French dominions, and was reduced at a blow to the realm of England. What was calamity to him was benefit to the English. People and sovereign were brought into closer connection than at any time since the Norman conquest. England contained a united nation. The Universities of Oxford and Cambridge were established. Learning, commerce, and agriculture prospered. The unquenchable spirit of Saxon freedom revived. Society and government at the Universities "rested on a purely democratic basis. Among Oxford scholars the son of the noble stood on precisely the same footing with the poorest mendicant." (*Green's History of the English People, chapter I.*) Merchant guilds were formed, boroughs obtained charters, serfs were manumitted, and all went well in John's absence. "Foul as it is, hell itself is defiled by the fouler presence of John," was the verdict of his contemporaries on his character. Green maintains that the verdict has passed into the sober judgment of history. He was a mass of wickedness, perfidy, and superstition. Pope Innocent III, laid the kingdom under an interdict in 1208, because John excluded Archbishop Lorngton from his see of Canterbury. "All worship save that of a few privileged orders, all administration of Sacraments save that of private baptism, ceased over the length and breadth of the country; the church bells were silent, and the dead lay unburied on the ground." John retaliated with fierce vigor. In 1212 the Pope issued a bill of deposition, and absolved his subjects from their allegiance. John met the Papal measures with insolent scorn. Had he been a wise and just ruler, the insular spirit of his people would have sustained him. But he was a despot, who believed that kingly will was popular law. The barons conspired against him, the church and the commonalty hated him. On the 15th of May, 1213, he submitted to become a tributary vassal of the Pope, and to swear fealty to him. He stooped to this degradation to secure the Pope's help in his despotic schemes. But in 1215 the barons took matters into their own hands, and on the 15th of July compelled him to sign the Magna Charta. The Great Charter recognizes the "community of the whole land" as the source of supreme power. It secured the right of self-taxation to England. It exempted the means of livelihood from all demands of the law, gave free trade to foreign merchants, and uniformity of weights and measures throughout the realm. John never intended to observe the terms of the instrument. The Pope annulled it by a bill, and excommunicated the barons in the same year. The people set Innocent at defiance. "The ordering of secular matters pertaineth not to the Pope," they growled, and religious worship went on as usual. In 1216, Louis, son of Philip of France, accepted the offer of the crown, and landed in Kent. The larger part of England submitted to him, and on the 19th of October, John died of fever and gluttonous debauch at Newark.

Henry III, son of John, was crowned at Gloucester, at the age of nine years. The French were defeated and forced to evacuate the country. Langton and the barons obliged the king to establish "the principle, so fruitful of constitutional results, that redress of wrongs precedes a grant to the crown." The Dominican "Begging Friars," who were itinerant preachers subsisting on the bounty of their hearers, now began their useful toil. Roger Bacon wrote his "Opus Majus" (*Greater Work*), which is "at once the Encyclopædia and the Novum Organum of the thirteenth century." The commonalty rebelled against the greedy exactions of the Popes, and declined to support the king in his foreign wars.

In 1232 Henry determined to remove all checks to his authority, and to govern his realm despotically. With customary patience his protesting subjects endured his usurpations for some time, but in 1244 united under the lead of Simon de Montfort, the Earl of Leicester, to oppose them. A spirit of manly defiance broke out in the lack of all legal remedies. The Earl of Norfolk refused aid to Henry, who replied with a threat. "I will send reapers and reap your fields for you," he said. "And I will send back the heads of your reapers," answered the earl. In 1258 Henry was obliged to call a Parliament at Oxford. The "Provisions of Oxford," arranged for the representation of the commonalty in all future Parliaments, and placed further restrictions on sovereign power. The hand of Montfort was in the whole. "If I fear the thunder, I fear you, Sir Earl, more than all the thunder in the world," said the king, in an outburst of petulant truthfulness. Edward, his own son, sided with Montfort in the struggle. In the "Baron's war" which broke out, Edward joined his father, and was captured with him by Earl Simon at the battle of Lewes. To strengthen himself and to secure the popular liberties, Montfort called two knights from every shire, and two citizens from every borough to sit with the baron and the bishop in the Parliament of 1265. Montfort then created a new and abiding force in English politics. The great patriot was slain in the battle of Evesham before the Parliament assembled. But his work lived. Prince Edward followed his body, with genuine grief, to the tomb. He believed in Earl Simon's opinions, but did not wish to see him more powerful than the king. Henry III died in 1272, and Edward returned from his Crusade in Palestine to ascend the throne.

Edward the First.

Edward was an Englishman to the core. The best and worst attributes of his subjects were blended in him. Imperious and cruel at times, he was strangely tender and sensitive at others. When convinced that he was in the wrong, he promptly avowed his fault with a burst of tears. His strong hand was needed to suppress the disorderly barons who waged war on each other, and who also robbed the traders. Mere ruffians many of those mailed aristocrats showed themselves to be. "Once, under cover of a mock tournament of monks against canons, a band of country gentlemen succeeded in introducing themselves into the great merchant fair at Boston; at nightfall every booth was on fire, the merchants robbed and slaughtered, and the booty carried off to ships which lay ready at the quay." Edward wisely hanged the chief of those marauders, and severely punished the outlaws who filled the country with bloodshed and terror.

The king was no less successful against the Welsh, and also in reforming the government of his foreign dominions. The great stain upon his administration was the expulsion of the Jews from England. Sixteen thousand of them sought refuge in France. "Many were wrecked on the passage thither. Others were robbed and flung overboard. One ship-master turned out a crew of wealthy merchants on a sand-bank, and bade them call a new Moses to save them from the sea." Dangers in the north next demanded his care. Scotland was uneasy. Its composite people—Picts, Scots, Saxons, Normans—were all politically united under one monarch. In 1290 the "Maid of Norway," heiress of the last king, died. Thirteen pretenders claimed the crown. Edward, as overlord, awarded it to Baliol in 1292, and for a while all was peace. Edward, however, asserted his supreme right to receive Scotch appeals, and thereby offended Scotch pride, and also weakened himself in the conflict which was impending with Philip of France. Baliol defied him, and invaded England. Edward retaliated with terrible severity, massacred eight thousand citizens of Berwick-upon-Tweed, overran the Scotch Lowlands, and immured Baliol in an English prison. The oblong block of limestone, which tradition said had been Jacob's pillow at Bethel, and on which the older Scottish sovereigns had been installed, was removed from the Abbey of Scone to Westminster Abbey, where it still remains under the coronation chair. His triumph seemed to be complete, but the Scotch were not subdued. Under the patriotic Wallace they repulsed the English at Stirling in 1297. Edward again returned to Scotland in 1298, routed the Scotch at the battle of Falkirk, and ungenerously cut off the head of the great patriot Wallace. Crowned in mockery with a circlet of laurel, the ghastly trophy was then placed upon London Bridge. The killing of Comyn by Robert Bruce in 1306, and the assumption of the Scottish crown by the latter, brought on another invasion. Bruce fled. Noble after noble was sent to the block. The Earl of Athol pleaded kindred with royalty. "His only privilege," burst forth the king, "shall be that of being hanged on a higher gallows than the rest." He himself succumbed to the great destroyer in the summer of 1307.

Edward the Second.

Edward II inherited the throne but not the various abilities of his great father. On the 24th of June, 1314, he was utterly defeated by Robert Bruce, king of Scotland, at the battle of Bannockburn. The Scotch forces were drawn up in hollow squares, or circles of spearmen, as on the fatal field of Falkirk. But better fortune attended them on this occasion. Bruce slew Henry de Bohun, an English knight, in single combat. "Bruce was mounted on a small hackney, and held only a light battle-axe in his hand; but, warding off his opponent's spear, he cleft his skull with so terrible a blow that the handle of his axe was shattered in his grasp." The flower of English knighthood shared in Bohun's fate. Edward escaped to Dunbar and the sea. The plunder of his camp enriched the needy Scots. Bruce remained master of Scotland. Edward again exhibited the weakness and obstinacy of his character by leaning on the Le Despencers, as he had formerly leaned on Gaveston. By their means he routed and captured the Earl of Lancaster at Boroughbridge. But they were far from being absolutists like himself, and consolidated the power of constitutional government by an enactment of the Parliament at York. Edward unfortunately alienated the affections of his queen, Isabella, and of their son, Edward. She raised the standard of revolt against him in 1326. In the following January the peers formally deposed him from the throne, and in September, 1327, he was murdered in Berkeley castle.

Edward the Third.

Prince Edward was placed in the vacated throne under the title of Edward III. The independence of Scotland was formally acknowledged in 1328. The king's own independence of his mother's paramour, Roger Mortimer, Earl of March, was next achieved by arresting that individual with his own hands, and procuring his condemnation by Parliament to a traitor's death. The queen-mother was sent into confinement for the rest of her life at Castle Rising. Edward had only reached his eighteenth year, but his wise and vigorous administration afforded brilliant augury of future greatness. In 1333 he defeated the Scotch at Halidon Hill, enforced the cession of all Scotland south of the Frith of Forth, and the homage of Baliol as vassal-king for the remainder. Equal success crowned his struggle with the Papacy. The Popes were in the habit of selling English livings in the church to domestic and foreign bidders. "The Pope's revenue from England alone is larger than that of any prince in Christendom. God gave his sheep to be pastured, not to be shaven and shorn,"—protested a later Parliament. But the Popes, then at Avignon in France, and

under French control, did shear the English sheep to the very pelt. In the sea-fight off Sluys, the French fleet was destroyed and 20,000 men slain by a far smaller force of English. At the battle of Crecy in Ponthien, Edward used artillery in field warfare—the first known instance of its employment. The fight began at vespers. So rapid was the English shot "that it seemed as if it snowed." The king refused to send help to his sorely-pressed son, the "Black Prince" of Wales. The battle changed into a massacre. "Twelve hundred knights and thirty thousand footmen—a number equal to the English force—lay dead upon the ground." Milan steel armor proved to be but a poor defense against the gray-goose shafts of the English archers. The same weapons broke a Scottish force a few months later, at Neville's Cross, where King David Bruce was made prisoner.

From the field of Crecy, Edward turned to the siege of Calais, which surrendered in 1347. Six of the citizens, barefooted, in their shirts, and with halters round their necks, gave themselves into his hands. He purposed to cut off their heads, but spared them at the intercession of his Queen, Philippa.

Though so renowned that the electors of Germany offered him the imperial crown in 1347, Edward was a savage at heart. His chivalric courtesy to knight and noble was the glittering cover of a profligate and brutal soul.

In 1348 came the dreadful plague known as the Black Death, which carried off more than one-half of the three or four millions of people in England. "Its ravages were fiercest in the greater towns where filthy and undrained streets afforded a constant haunt to leprosy and fever." The villages suffered almost as much as the towns. Half the clergy perished. Harvests rotted on the ground, and fields were left untilled because of the scarcity of hands. Wages rose suddenly. The prices of food rose correspondingly. Labor could not be had in sufficient force. Parliament in 1350 once more tied the laborer to the soil, and progress to civil liberty was forcibly arrested. In 1355 war with France was resumed. At the battle of Poitiers the French king was taken, while desperately fighting, together with a crowd of nobles, and was led captive to London. The captured nobles were ransomed by sums extorted from the miserable peasantry, who, driven mad by oppression and famine, rose in wild rebellion, butchered their lords, and fired their castles over the whole face of France. This peasant rising was called the Jacquerie. France was so wasted that it could not sustain Edward's army. England, afflicted by pestilence, famine, scarce labor, and bad legislation, was in little better condition. The poor rose in bitter and resolute protest against the system of social inequality that oppressed them. Their protest has been many times repeated, and last of all in 1880-81 by the farmers of southern and western Ireland. John Ball, "a mad priest of Kent," preached everywhere the natural equality and rights of man.

> "When Adam delved and Eve span,
> Who was then the gentleman?"

was the homely and popular rhyme which condensed his doctrine and threatened the downfall of the system of the Middle Ages. Chaucer's "Canterbury Tales," and Longland's "Complaint of Piers, the Ploughman," show the great difference between the condition of the rich and poor. The general misery turned the mind and the heart of the nation toward God, and prepared them for the translation of the Scriptures by John Wyclif, Master of Balliol College, in the University of Oxford, and recognized as first among the schoolmen of his day. This "morning-star of the Reformation" was one of the ablest and most versatile men of his own time, and the first who dared to publicly deny the errors of the Romish Church, and to assert the freedom of religious thought against its suffocating tyranny.

The power of Edward began to decline at the moment of its proudest height. His French provinces refused to sink into mere appendages of the English crown. The Free Companies,—adventurers whose services were sold to the highest bidders,—harried the wasted land. The invasion of Spain by the Black Prince was fruitless of good results. The French king wrested province after province from his grasp. Internal strife between labor and capital rent England to the heart. Edward himself degenerated into a tyrant, the Black Prince died, domestic troubles increased, and the nation was ready for a change of sovereigns when, in the summer of 1377, Edward the Third died in a dishonored old age—robbed on his death-bed, even of his rings, by the dissolute mistress to whom he clung.

Richard the Second.

The son of the Black Prince, succeeded his grandfather at the age of eleven years. Socially, the times were evil. The real blessings of the realm were the most despised. These consisted of the "Simple Priests" who with bare feet, russet dress and coarse sermons, were sent out by Wyclif to denounce the fallen priesthood, and to proclaim, in popular language, the message of salvation. These predecessors of the local and itinerant preachers of the Wesleyan Methodists were the pioneers of the Reformation. The Peasant Revolt broke out under the lead of Walter Tyler, whose adherents proudly boasted that they "were seekers of truth and justice, not thieves and robbers." They demanded that bondage should be abolished, and that villein services should be commuted for a money payment. Richard, the boy-king, promised everything; and the peasants, with his letters of pardon and emancipation in their hands, joyfully returned to their homes. They were soon to find out what royal promises, extorted by necessity, are worth. The spirit of slaveholders dies hard. Like the devils of New Testament times, it tears its victims before it leaves them. Richard and his nobles retracted all they had granted, at the first opportunity. The Essex men displayed his own charters, and protested that "they were so far as freedom went, the peers of their lords." "Villeins you were," answered Richard, "and villeins you are. In bondage you shall abide, and that not your old bondage, but a worse!" But the hot-headed Rehoboam could not fulfil his threats. The Bible and the itinerant preachers were abroad in the land, and the power of Papal craft and baronial violence could not prevent the political liberty of those whom God had made free. The Bible and the school-book are more than a match for sword and fire-arm in the long run. In twenty years the small freeholders were the recognized basis of the electoral system in every English county. Villeinage rapidly died out, and its last remnant disappeared from Scotland about the beginning of the present century. In vain did the aristocracy assert that "their serfs were their goods." "I believe that in the end the truth will conquer," said Wyclif at Oxford. It did conquer, and in conquering annihilated serfdom. He and his "Simple Priests" affirmed the right of private judgment, and that the Bible is the sole rule of faith and practice, with such success that people said: "Every second man one meets is a Lollard." "Women as well as men became the preachers of the new sect." "Scripture," complained a canon of Leicester, "became a vulgar thing, and more open to lay folk and women that knew how to read than it is wont to be to clerks themselves." The Lollard books found their way to Bohemia, and stirred up the preaching of John Huss and the Hussite wars.

Richard aimed to make himself an absolute governor. As such in 1398 he forbade a duel between the Dukes of Hereford and Norfolk. The latter he sentenced to banishment for life, and Henry of Lancaster (Hereford), to exile for six years. While Richard was engaged in the conquest of Ireland, Lancaster returned, and all England greeted him with

hearty welcome. Richard was betrayed into Lancaster's power in Wales, and was solemnly deposed by Act of Parliament in 1399. In less than two years after that he came to his death in Pontefract Castle; and with him ended the direct line of the Plantagenets.

SYNCHRONOLOGY, 1189–1399.

GREAT BRITAIN AND IRELAND.	
Richard defeats Saladin at Ascalon, 1192.	The Jews become the leading financiers in the world, 1196.
Butchery of the Jews by John, 1204.	Inquisition established by Pope Innocent III, 1204.
London incorporated and chartered, 1208.	Crusade against the Albigenses preached, 1205.
Ireland subdued and English laws and customs introduced, 1210.	Genghis Khan said to have caused the death of fourteen millions of human beings, under pretense of making all men worship one God. He died in 1227.
Magna Charta granted at Runnymede, 1215.	Aristotle's works condemned by the Council of Paris, 1209.
Coal discovered at New Castle, 1233.	Doctrine of transubstantiation and auricular confession established, 1214.
Wales united to England, 1282.	Houses in European cities still thatched with straw, 1233.
Edward I conquers Scotland, 1296.	Sicilians massacre 8000 French men, women, and children on Easter Day, 1282, and call the atrocity "The Sicilian Vespers."
John Wyclif died, 1384.	Ancient learning revives; arts and sciences improve; liberty progresses, 1300.
	Cards were invented in France for the king's amusement, 1391.
	Tamerlane takes the city of Delhi, 1399.

CHAPTER LIV.

GREAT BRITAIN AND IRELAND, 1399—1485.

The House of Lancaster.

Henry IV, son of John of Gaunt, and grandson of Edward III, was a subservient tool of the Romish church. Through his instrumentality the infamous Statute of Heresy was passed by the Parliament at the beginning of 1401; and in February of the same year William Sautre, a parish priest at Lynn, who had preached against Romish idolatries and who refused to recant, was handed to the secular power, and on the issue of a royal writ, publicly burned. The Welsh revolted, and under the command of Owen Glendower, remained unconquerable. The Percies of Northumberland rebelled but were defeated at Shrewsbury in 1403. Henry Percy (Hotspur) was slain. Repeated conspiracies and rebellions demonstrated the insecurity of the throne. The second overthrow of the Percies at Bramham Moor, in 1408, put an end to danger from that direction. But a worse foe, in the shape of epilepsy, now assailed the king. Prince Henry, the "Prince Hal" of Shakspeare, virtually ruled the realm, and was crowned on the death of his father in 1413.

Henry The Fifth,

The rollicking boon companion of rakes and drunkards shook off all such evil habits on his assumption of the royal dignity. He even showed considerable favor to the Lollards, and especially to his trusted official and valued friend, Sir John Oldcastle, Lord Cobham, the leader of the reformers. But the church was too strong for him—its friendship too necessary. Continuous persecution drove the Lollards into revolt. Thirty-nine prominent ones were executed as traitors. Cobham himself was doomed, but escaped for four years, during which he strove to rouse revolt after revolt. But public opinion was not sufficiently mature and intelligent to sustain him. He was at last captured on the Welsh border, and burned as a heretic.

Henry now demanded the restoration of the English possessions in France, and even claimed the crown of that country. Refusal and war followed. His signal victory over the French at Agincourt illustrated his character, and strengthened him in the estimation of his subjects. His mere handful of men was opposed by sixty thousand French soldiers. A knight wished that more of his compatriots, then in England, were present. Henry answered with a burst of scorn. "I would not have a single man more," he replied. "If God gives us the victory, it will be plain we owe it to His grace. If not, the fewer we are, the less loss for England." His sick and starving warriors shared his spirit. With bared arms and breasts they gave free play to "the crooked stick and the gray goose wing." Henry was felled to the ground, but quickly rose again. The carnage was dreadful, the English victory complete. The glory of Crecy was surpassed, for the odds were greater. Eleven thousand Frenchmen lay dead on the field, and over a hundred princes and great lords were among the prisoners. At the siege of Rouen, the French soldiers thrust twelve thousand country folk out of the city into the space between the walls and Henry's encircling lines. The pitiless king refused to let them pass, and there they perished. "War," he said, "has three handmaidens ever waiting on her,—Fire, Blood, and Famine,—and I have chosen the meekest maid of the three." By the Treaty of Troyes he was formally recognized as the future sovereign of France, but he did not survive to become such in fact. Regretting that he had not lived to achieve the conquest of Jerusalem, he passed away in August, 1422.

Henry the Sixth—1422–1461.

Henry VI was only nine months old when peacefully acknowledged as monarch. The Duke of Gloucester administered the affairs of England in his name, and his uncle, the Duke of Bedford, governed France as regent. The latter country was terribly desolated. Misery and disease killed a hundred thousand people in Paris alone. Orleans was besieged by a handful of English numbering only three thousand. France was terrorized by English victories. The spell was broken at last by Jeanne d'Arc, the child of a laborer at Domremy, on the edge of the great woods of the Vosges. Of deeply religious temperament, poetic, impassioned, and dutiful, she believed that St. Michael appeared to her in a flood of blinding light and bade her go to the help of the king, and restore to him his "fair realm of France." Parent and priest opposed her mission. "I had far rather rest and spin by mother's side," she pleaded with a touching pathos, "for this is no work of my choosing, but I must go and do it." Charles received her in the midst of a throng of nobles and soldiers. "Gentle Dauphin," said the girl, "my name is Jeanne the Maid. The Heavenly King sends me to tell you that you shall be anointed and crowned in the town of Rheims, and you shall be lieutenant of the Heavenly King, who is the King of France."

The age was superstitious. Friend and foe believed more or less in her character and mission. She was only eighteen, tall, finely formed, vigorous, and enduring. "As she mounted her charger, clad in white armor from head to foot, with a great white banner studded with *fleur de lys* waving over her head, she seemed "a thing wholly divine, whether to see or hear." Shrewd and sensible, she never lost her mental balance, even when suffering from wounds and insults. Chaste, tender-hearted and devoted, she deemed her mission completed with the coronation of the king at Rheims, and longed to return to her humble life as a shepherdess. When she fell into the hands of the English, her wearing a man's dress was accounted as religious heresy, and in May, 1431, she was burned as a witch in the market-place at Rouen. "Soon as the flames reached her, the girl's head sank on her breast. There was one cry of 'Jesus!'" "We are lost," an English soldier muttered as the crowd broke up; "we have burned a saint."

The English cause was lost. Henry was crowned at Paris, but Bedford died, and his able successor, the Duke of York, who held command in France until 1444, could barely hold his own. In 1445 Henry married Margaret of Anjou. Maine

was ceded to the queen's father, the Duke of Anjou. The other provinces rose in revolt, and the surrender of Cherbourg in 1450 left Henry without a foot of Norman ground. Calais only remained in his hands in 1452. Discontent in England took the form of popular insurrection under John Cade about the same time.

As Henry VI remained childless it was proposed in the House of Commons that the Duke of York be declared heir to the throne. In 1452 the latter, in view of the king's insanity, was made Protector of the Realm. When Henry VI recovered his senses and his power, the Duke of York did not abandon all intention of succeeding or supplanting him.

The Wars of the Roses.

The deadly civil struggle which followed received the name of the Wars of the Roses, from the white rose which was the badge of the House of York and the red rose which was the crest of the House of Lancaster. Hostilities began afresh in 1458. In 1460 Henry was defeated and captured at the battle of Northampton. Richard of York was a rebel without doubt, although the nation's choice for its ruler. Defeated and slain at the battle of Wakefield, his head was crowned with paper and impaled on the walls of York. His son Edward succeeded to his title and pretensions, and avenged his death on the bloody field of Towton, in March 1461. Over 20,000 Lancastrians lay dead on the field. The loss of the Yorkist was nearly as heavy, but their triumph was complete. Henry and his queen was driven out of the country, and the crown passed over to Edward of York.

The House of York.

Edward IV was overshadowed for some years by the renowned, but crafty and perfidious Neville, Earl of Warwick, the "King-maker." The Nevilles foiled all Lancastrian risings. After his defeat by them at Hexham in 1464. Henry IV was betrayed into the hands of his enemies. "His feet were tied to the stirrups of his nag, he was led thrice round the pillory, and then sent as a prisoner to the Tower." Edward of York was as treacherous as Warwick, quite as pitiless, and more secretive and cunning. He determined to kick down the ladder by which he climbed to the throne, and to make himself the absolute ruler of his people. By his marriage with the widow of Sir John Grey, he cut off all of Warwick's negotiations for his union with a French princess; and by his skillful intrigues alienated the Yorkist party from the veteran earl. Warwick was obliged to throw himself into the arms of the Lancastrians. Edward's schemes failed for the time being, his army deserted him, and he was compelled to seek shelter in Burgundy. Henry VI emerged from his prison and reascended the throne. But his second lease of power was very brief. The fugitive usurper reappeared at Ravenspurn, in 1471, at the head of an army, which increased all the way to London, when the imbecile Henry was again sent to the Tower. At the battle of Barnet which followed Edward was the victor, and Warwick was left dead in the field. The battle of Tewkesbury, in which Edward used a fine train of artillery, gave Queen Margaret into his hands. Henry VI mysteriously died in the Tower, and his son was murdered after his surrender upon the battle-field.

Edward was now firm in his seat, and felt himself to be sufficiently powerful either to suspend the session of Parliament, or to make it the mere registrar of his will. Its legislative functions were usurped by the royal Council; arbitrary taxation in the shape of benevolences and forced loans ground the people; spies and arbitrary imprisonments almost extinguished personal liberty, and justice was degraded and turned backward. Belief in sorcery and magic was almost universal. The clergy were ignorant and corrupt. Learning was no longer fostered at the monasteries. The only promises of a brighter future were the growing study and love of the Bible, and the introduction of the printing press by William Caxton in 1476. Each of these helped the other, and also fostered a love of literature that was certain, in the outcome, to reassert the ancient and constitutional liberties of Englishmen. Worn out with excesses the king died in 1483.

Edward the Fifth.

Edward V was peacefully seated in the royal chair after his father's decease. As he was only thirteen, his uncle Richard, Duke of Gloucester, was proclaimed Protector of the Realm. The crime of Edward IV was now visited upon his innocent son, who with his brother, was confined in the Tower, and there—as was popularly believed—murdered at the instigation of Richard. The boy's reign was merely nominal.

Richard the Third—1483–1485.

Prior to the death of the youthful monarch, Richard had assumed the sceptre in response to the prayer of Parliament. Henry Tudor, Earl of Richmond, a nobleman of Welsh paternity, and a claimant of the crown through his mother, now prepared to dispute its possession. The Duke of Buckingham lent his aid, rose in revolt, but failed and lost his head. Richard strove to fortify himself against danger by convoking Parliament in 1484, and by sweeping measures of reform. These were simply expedients and as such were abandoned as quickly as he felt himself to be safe. Hypocrite and murderer, as the people held him to be, their convictions and passions, like the hidden fires of a seething volcano, were gathered in a force whose explosion would hurl him from his blood-stained eminence. Henry landed at Milford Haven in 1485. His army came in conflict with that of Richard on Bosworth Field, in Leicestershire, on the 22nd of August. The Stanleys deserted in the crisis of the fight to Henry's side. With a cry of "Treason! Treason!" Richard desperately rushed into the thick of the battle, dashed the Lancastrian standard to the ground, and hewed his way into the presence of his rival, where he fell—overpowered by numbers. The crown he had worn was found near a hawthorn bush, and was placed on the head of the conqueror. With Richard ended the Yorkist branch of the Plantagenets, and with him closed the history of the middle ages in England.

SYNCHRONOLOGY, 1399–1485.

GREAT BRITAIN AND IRELAND.	
Chaucer dies, 1400.	The Yu Ho Canal completed in China *circ.* 1400.
Wyclif's works burnt at Oxford, 1410.	Battle of Angora. Bajarzet. the Turk, kills himself by dashing his head against the bars of an iron cage that he is said to have prepared for his adversary, 1402.
University of St. Andrew in Scotland founded, 1411.	John Huss burnt in 1415, and Jerome of Prague in 1416.
Revenue of Henry V, £284,800.	John, King of Portugal, carries his arms into Africa, 1415.
Lord Cobham martyred, 1417.	Island of Madeira discovered by the Portuguese, 1420.
Wyclif's remains burnt and thrown into the Swift, 1428.	Paris taken, and held by the English for 15 years, 1420.
English burn Joan of Arc as a witch, 1431.	Joan of Arc forces the English to raise the siege of Orleans, 1428.
Insurrection of Jack Cade, 1450.	Pope Clement VIII at Avignon resigns the tiara, and thus terminates the "Great schism of the west."
Wars of the Roses begin, 1453.	Hungry wolves entered the city of Paris, where 50,000 persons died of famine, 1438.
Caxton sets up his printing press, 1471.	Constantinople stormed by the Turks, 1453.
Battle of Bosworth, 1485.	Faust died at Paris whither he had journeyed to sell his Latin Bible, 1466.
	Æsop's Fables, printed by Caxton, the first book with numbered leaves, 1484.

[TO BE CONCLUDED.]

"The Kitchen Garden," described in the March number of The Chautauquan, is spreading rapidly. Classes have been formed in Brooklyn, Philadelphia, Boston, Albany, Troy, Pittsburg, St. Louis, Cincinnati, and many smaller places. The system has also been introduced among the colored people, and the managers are striving to make it a part of the course of instruction in every industrial and public school in New York city. The work is worthy of all commendation, for it helps the poor to help themselves.

COMMON SENSE IN HYGIENE.

Persons of middle age, and beyond, will readily remember that the subject of this discourse was never met with in their earlier reading. What, then, is Sanitary Science, what then is the history of its origin, and what are some of its practical applications, are questions which may indicate the drift of the following sketch. A sketch merely it must be, of necessity, since the subject is so vast, and its multitudinous students, numbering among them many of the most noble and learned men of the age, have already produced a voluminous literature. Indeed, this new science had hardly taken definite shape when it became necessary to recognize distinct departments of investigation and of effort to which its cultivators should most successfully restrict their studies. The field is too broad for one mind.

Sanitary Science is simply the recognition of the essential conditions of health and the scientific application of the means necessary to its protection and preservation. It is broadly distinguished from medical science by the fact that, while the object of the latter is to cure us when we are attacked by disease, the object of the former is to protect us from the attack altogether. The success of sanitary science in the accomplishment of this object, involves a large abridgment of the functions of the medical practitioner. Yet, strange as it may seem, from a business point of view, the most active and zealous promoters of sanitary reform were, in the beginning, and are now, almost to a man, physicians. I once had the temerity to ask one of the most distinguished physicians in the State of New York if all his professional brethren sympathized with the great movement which looks so directly to the diminution of their business. His answer, uttered with great emphasis, and evident pride, was this: "I do not know any physician so mean—and there are some mean men in the profession—who does not wish this movement the highest measure of success." And yet seldom do we see in print, or hear from the platform, any recognition of the uncompensated toil of these men to whose labors, it may now fairly be said, every inhabitant of every civilized land is a debtor, to a greater or less extent. This work has been done quietly—so quietly, indeed, that comparatively few know that it has been done at all. No demand for public recognition or honor has found place in the journals of the profession, or in the utterances of its state or national assemblies. Even the proverbial bitterness of the rival schools has been forgotten, and the most zealous medical sectarians have joined in this grand charity with a heartiness which might well be accepted as a shining example by other professions. Imagine, by way of comparison, a state or national convention of lawyers, paying their own traveling and hotel expenses, sacrificing their business interests at home, and spending a week in devising ways and means to enable people to settle their differences without invoking the aid of courts and lawyers. The achievements of sanitary science, even in the first decade of its existence, are simply miraculous. It now lays its hand on the most fearful pestilence and disarms it of its power to harm. It comes as an evangel of good news to men,—promising length of days to those who obey the divine laws of the physical world;—rescuing childhood from the hand of its destroyers, and rendering the closing scenes of age an euthansia. It is sad to reflect that such a revelation has been so long delayed; that, in fact, it has never even been possible until now. So long as the worthlessness and the vileness of the human body was a cherished part of the creed, all effort and care for merely the physical well-being could find no favor. The body was the great antagonist of the soul—the more it could be made to suffer the better for the soul. The notion, long so common, that disease was an exhibition of divine punishment for some sin, known or unknown, when followed to its logical conclusion, rendered any effort toward its alleviation an act of deliberate hostility to divine government. The insane and plague-smitten were under divine condemnation—social and domestic claims and relations were dissolved and the wretched sufferer became an outcast and was left to perish. Asylums and hospitals belonged not to that age.

The reaction came, but it came slowly. The hardness of heart gradually softened into pity, sympathy and philanthropy. The suffering became the special care of the good and the cultured. Hospitals, asylums and refuges sprang up in all Christian lands. Be it observed that all this array of noble effort was directed solely to the alleviation of suffering, not its prevention. That was reserved for a later day.

Sanitary reform was still impossible until another revolution in public belief should take place, and that in another field of thought. Though human diseases might no longer be regarded as inflictions of punishment, yet while they were held as smitings from a hidden hand, while the pestilence still walked in darkness, effects traceable to no cause, or effects of an inscrutable cause—all thought of defense and protection was idle. The essence of the sanitary project is *prevention*, and, until the causes and conditions of disease could be somewhat understood, there could, of course, be no intelligent method of prevention proposed.

The grand precursor of this idea of prevention of disease was the priceless discovery of Dr. Edward Jenner, who, just ninety years ago, demonstrated the means by which one of the most dreaded of pestilences is put completely under human control. Previous to this discovery ninety-six deaths in every thousand, in England, were from small-pox; shortly after the proportion had fallen to thirty-five per thousand. It is now well understood that the ratio of deaths from small-pox, in any community, simply indicates the extent to which vaccination has been practiced. This discovery was an inspiration. If one disease can be fairly met and overcome, why not another? The mental activity thus excited has at last begun to foreshadow the glory of its clustering achievements. Pestilence and war have always been the great destroyers of human life, yet out of this very darkness and terror has man at last drawn the secret of banishing the one and of preventing many of the sufferings formerly inseparable from the other. A mere glimpse at the history of sanitary progress must suffice. The idea of the communicability of many diseases from the sick to the well was of exceedingly slow growth, and has not, even yet, taken fair hold of the public mind.

Few pages of history show up human stupidity in a stronger light. Men seem to have had a glimmer of this truth, when, in the middle ages, the returning crusaders brought leprosy from the Holy Land into France and Italy. Persons coming from infested places were subjected to a detention, usually of forty days, to demonstrate their freedom from the disease. Thus originated the quarantine system now practiced by all commercial nations, with various modifications.

The alarm produced by the advance of cholera, in 1832, from its home in Asia into central and western Europe, and its manifest importation into America, startled into great activity all minds habituated to search for a cause behind every phenomenon, and proved another most important precursor of what we now call sanitary science. The somewhat shadowy notion of contagion—communication of disease by personal contact—now emerged from its obscurity into the full light of a demonstrated fact. Among the more distinct and immediate antecedents of organized sanitary effort, as it exists to-day, may be mentioned the Crimean war of 1855, and, more especially, the Southern rebel-

lion in the United States. When, in the spring of 1861, 75,000 men were suddenly called to arms, the sufferings to which they were necessarily exposed on account of the lack of organization everywhere in the army, especially in the commissary and medical departments, stirred the sympathy of the whole North, as human sympathy had never been stirred before since the world began. It was no mute, helpless paralysis of agony—it was intense, intelligent and active. The suggestion of a sanitary commission ran like an electric thrill through all hearts and hands. But we stand too near the magnificent embodiment of Christian charity to estimate its greatness and its goodness. Its history cannot yet be adequately portrayed.

When the terrible necessity, out of which it was born, had passed away, the great idea of organized effort for good remained, and has already produced abundant fruit and gives glorious promise of a golden harvest in the near future.

For reasons which I have no space to give, it was apparent that sanitary reforms could never be accomplished if left to the spontaneous movements of individuals or small communities. Compulsion must be applied and that with a vigorous hand actuated by broad principles. Hence the power of law must be invoked.

Accordingly, soon after the close of the war, state Boards of Health began to be organized, the first being that of Massachusetts, in 1869. At this time one-half the states of the Union have perfected such organizations for the protection of the health and lives of their citizens.

Inasmuch as sanitary science aims at the *prevention* of disease, it could possess no philosophical basis until something should be known as to the causes and conditions of the diseases it proposes to forestall. Previous to the investigations of Franklin, no better protection against the thunderbolt was known than the ringing of a consecrated bell: now the bristling rod disarms the surcharged cloud, in a manner not shrouded in mystery, but clearly understood by all. The revolution which has since taken place in the domain of pathology is not less fundamental. No more forcible illustration of this revolution need be adduced than a comparison of the nomenclature and classification of diseases at present in use, with that of a half-century ago. Every one is familiar with the term *zymotic*, as applied to a large class of diseases. Its use is of recent origin, because it embodies a new idea. The prevalence of its use throughout the medical literature of the present day attests the popular favor with which it is generally received. It is my purpose, in this paper, to sketch briefly the origin of the *Zymotic Theory* of disease, not from the stand-point of medical, but from that of sanitary, science.

The fact that certain diseases are *communicable* from the sick to the well, and occur in no other way, is so obvious that it has always been clearly recognized. But as to the precise mode of communication, which, for the purposes of prevention, is the vital question, few ever seemed to investigate or even theorize until very recently. The moment scientific research began in earnest, it rapidly became apparent that other diseases belong to this category of communicable diseases, until now a large list is placed under this head.

This progress in medical knowledge is in harmony with the intellectual activity of the age, which, with patient but persistent effort, seeks to find in every physical phenomenon its immediate cause. It is, in fact, the clearer recognition of the prevalence of law everywhere in the material universe. So strong is this disposition, that when the cause eludes absolute verification, a hypothesis must be constructed, which shall afford a rational, though incomplete, explanation. On no battle-field more than that of his struggle with the diseases which attack him, has man sought for their causes so little in former ages, or so much and so successfully as in the present. Formerly deep mystery veiled the whole question, and in this mystery was free verge for the play of all imaginable demoniacal and malign spirits and influences, but no room for a law which sets forth every fact as an effect, and behind which somewhere and always stands a cause. Now, on its first appearance, every fact is tried with the most refined methods of torture, scalpel, re-agent and lens, until it renders an intelligible and consistent account of itself, or, if not fully that, at least a plausible hypothesis.

This tendency of the human mind has wrought many wonderful revolutions in our conceptions of our relations to the physical world, but none more beneficent, and full of promise for the future than the revolution in medical science, by the new and philosophical notions it has introduced concerning the causes of disease.

So long as disease was regarded as a fact without a cause, or, at least, without an ascertainable cause, the natural and only method was to deal with it as an antagonist to be destroyed sternly and summarily. The safety of the patient lay in the destruction of the demon which possessed him. But when disease comes to be regarded as the natural and regular effect of known causes, the matter is placed in a new light. The great science of medicine is now rapidly facing about, and the recognition of cause and effect, here as elsewhere, suggests the idea of destroying or controlling the cause, and thus to forestall the inevitable effect. In other words, the problem of old medicine was, *how to cure*—the problem of new medicine is, *how to prevent*. Thus, medicine verges largely toward sanitary science.

To trace the rise and development of the zymotic theory of contagious diseases would lead us along one of those great lines of intellectual progress, which, at the same time, shows the incalculable value of the new method of investigation, and also the utility, in the absence of absolutely demonstrated facts, of a rational and consistent working hypothesis, productive of results obtainable in no other way.

It is true, we find here and there, in the speculations of the ancient physicians, suggestions which might seem to mark the origin of this theory, yet they were but guesses among countless others, the outgrowth of imagination rather than of profound attention and study and productive of no results. The real foundation of the theory, I am inclined to think, was laid almost exactly two centuries ago, when the newly invented microscope, rude as it then was, suddenly revealed to the Dutch philosopher, Leeuwenhoek, the hitherto unsuspected microcosm, teeming with life in varieties and gradations as vast and wonderful as those previously known to the unaided eye. He first observed and recorded the fact that, in the process of fermentation, practiced from time immemorial, in bread-making and brewing, minute spherical or ovoid bodies, in countless numbers, are always present. Yeast, then, is composed of these organisms so minute that it would require more than six millions of them to cover a square inch of surface. If, then, a little leaven leavens the whole lump, how inconceivably rapid must be the multiplication of these cells. But the Dutch savant had too many discoveries on hand to pursue all of them to any great length, and the study of the yeast plant was not resumed until about fifty years ago. Its analogies to the vegetable kingdom were then, by the help of improved instruments, definitely ascertained, and also the fact of its invariable presence in the fermentation of saccharine bodies. Then the important question arose, does the yeast plant cause fermentation, or is it the product of this process? It may serve to show us how very recent is our knowledge of this subject, to remember that, so late as 1840, Liebig, then the foremost chemist of his age, in a paper presented to the British Association, brought forward with great force and clearness, his celebrated theory that the mere contact of

heterogeneous bodies under favorable conditions, was the chief cause of a large number of chemical reactions. Among other illustrations he cited the processes of fermenting beer, wine, the production of alcohol, acetic acid; and in the same category of processes he includes the action of certain poisons and contagions. For all these he claimed a purely chemical cause.

Thirty years later—1870—Liebig, writing on the same subject, admits some change of view, but precisely what he does not make plain. As so often happens with men who have devoted themselves too exclusively to the confirmation of their own ideas, he had neglected to observe what other workers and thinkers were doing in the mean time.

It was only in 1843 that this question was settled by the decisive, yet simple, experiment of placing a fermentable liquid in a vase divided by a porous partition through which the yeast-cells could not pass, but which would permit a free circulation of the liquid. In one compartment a little yeast was placed, and there only did fermentation occur. It was now clear that the microscopic plant was the cause of this remarkable process. In the light of still later discoveries, these facts have acquired a larger significance than they could ever have possessed otherwise.

Let us now glance, for a moment, at a different line of study. The notion that both animals and plants may, under favoring conditions, arise spontaneously, that is, without being the reproduction of similar organisms, has been widely held from the remotest times. While it was admitted that there is a fixed law of descent, each plant or animal producing its kind and not another, yet the converse was not admitted, that in all cases each kind was always the lineal descendant from one of its kind.

Did not a fertile soil produce weeds? Did not putrefying flesh generate worms? The latter question was effectually answered in 1668 by Redi, an Italian philosopher, who placed bits of fresh meat in wide-mouthed bottles, some of which were covered closely with paper. All were then exposed to the warm sunshine. The meat putrified alike in all the bottles, but maggots appeared only in those to which the flies had access.

After Redi's experiments, when the microscope had revealed the hitherto invisible orders of minute animal and vegetable life, the notion revived that at least these lowly organisms may require only certain conditions in order to spring into existence. Experiments, which in those days passed unchallenged, seemed to favor the conclusion. Drop a dry leaf or a bit of hay in a glass of water, place it in the warm sunlight, and in a short time it will teem with infusorial life. It would be a long story to tell how patiently, and sometimes how hotly, this question has been pursued during the last quarter of a century. There is only room here to say that with each step in more refined methods of research and observation, and with the elimination of one possible source of error after another, previously unsuspected, the possibility of the spontaneous origin of life in any form, however low, has been steadily dwindling toward the vanishing point, until at the present day few remain as serious advocates of this venerable and obsolescent theory.

One of the incidental, although by no means the least important results, of the long and laborious investigations just alluded to, made by many hands both in this country and in Europe, is the astonishing fact, constantly encountered, that the atmosphere is everywhere pervaded with the germs of organisms which produce decompositions in solutions containing suitable organic matter. Indeed, such solutions can be preserved from decomposition only by heating them to a temperature presumably sufficiently high to destroy the vitality of all the germs present in them and excluding the air, or admitting it only after filtration through minutely porous substances. The revelation of modern science, that at every breath we probably inhale countless germs capable of developing, under favorable conditions, into the minute bodies which bear to putrefaction the same relation that the yeast plant bears to fermentation, is neither very comforting nor poetical, and yet it may, nevertheless, prove of exceeding value to those whose study it is to lighten somewhat the heavy burden of human suffering.

It is to be distinctly borne in mind that the only forms of disease to be considered are those which are in some manner communicable from person to person. In other words, they are diseases which do not rise spontaneously. They are not due merely to conditions. Sudden exposure to cold may induce active disease of the digestive and respiratory organs. Improper food may cause disorder of the digestive system. Intense mental application may derange the nervous organization. But when small-pox or scarletina occurs, no one, in these days, supposes that the disease springs up spontaneously, or is, in any sense, the result of surroundings or conditions. It is referred to some infected person by whom or from whom *something* has been communicated to the person of the patient, initiating and repeating the same series of phenomena essentially in the latter that had taken place in the former.

In modern times writers on pathology have been inclined to enlarge very greatly this class of diseases, including in it a large number which, until lately, were seldom, if ever, regarded as communicable from person to person. To this class the term *Zymotic* is now applied, and in it are generally included such diseases as small-pox, measles, scarletina, diphtheria, whooping-cough, typhus fever, typhoid fever, cholera, cerebro-spinal meningitis, yellow fever, etc.

The question of the communicability of such diseases as these is no longer a matter of dispute, but to form a rational account of the mode of communication and propagation, is a difficult task. Still, in spite of the difficulty, the problem is attractive and inspiring to all who love scientific research, especially when its aim is to alleviate human affliction.

Of the various theories which have been offered to explain the spread of this class of diseases, we can mention only two of the more important. The first is commonly designated as the *Chemical Theory*. The projectors of this theory supposed they found in the process of ordinary fermentation a phenomenon quite analogous to that of communicable disease. Fermentation, it was held, was essentially a process of decomposition, decay and putrefaction, and a portion of matter, *however infinitesimally small*, while in this condition, could infect or inoculate a healthy organism. This theory recognizes *the specific character of this infection or contagion*, since each disease reproduces itself regularly and invariably, subject only to modifications arising from constitutional differences or surroundings. Small-pox produces small-pox only, and not cholera. Precisely how a minute particle of matter communicated by a touch, or borne in the air and inhaled, could superinduce a tendency toward putrefactive change in an organism in perfect health, this theory fails clearly to explain.

Moreover, when it is observed that this theory rests chiefly on a view of the process of fermentation which has been long known to be entirely erroneous, it obviously is doomed to an early obsolescence. We have now come to know that the active forces of fermentation are organizing and not disorganizing forces, that the phenomena are due to the multiplication of a plant—the yeast plant—which, though invisible to the unaided eye, nevertheless has its specific character and possesses the power of reproducing itself, under favorable circumstances, as really and certainly as has a grain of wheat, yet with a rapidity unknown among plants of more complicated structure.

The second theory—usually designated as the *Germ Theory*, or the *Zymotic Theory*, in contradistinction to the

Chemical Theory,—is, like the latter, based on the analogy of the fermentative process, but on the true instead of the false view of that process. It is held that in case of a disease of this class, its immediate cause is due to the entrance of microscopic, or perhaps ultra-microscopic, organisms which multiply with wonderful fecundity, pervading the system, and by their presence deranging and poisoning it with more or less potency. Escaping and finding, by any means, access to another similar organism, the process is repeated in all its essential features.

While it is difficult to conceive of disorganizing changes progressing in such a great variety of ways, as the former theory would suggest, it is easy to understand how living and growing germs, differing as widely among themselves as do the plants with which we are familiar, should produce different effects upon the systems in which they find a habitation and which they rob for their own nourishment, and which they possibly poison by their noxious exhalations. Hence it is supposed that each zymotic disease is due to a distinct species of germ.

This theory gives a rational explanation of the *indefinite propagation* of disease while the chemical theory is particularly weak in this respect. The potency of a poison bears some ratio to its quantity. Strychnia, in certain quantity, is fatal; but in a fractional quantity is medicinal. A poison, if not fatal, usually vanishes at last from the system by elimination, but *does not migrate to another*, or reproduce its effects by infection or contagion. The germ theory, however, affords a very simple explanation of the indefinite propagation of such diseases. Everybody knows now, thanks to Jenner, that on the point of the finest needle may be conveyed from one person to another a sufficient quantity of vaccine lymph to produce a marked disturbance of the system, leaving it a sterile field for the germs of small-pox, should it be exposed to them. How inconceivably is this millionth of a grain of matter diluted as it mingles with the whole volume of the blood and diffuses itself throughout every fibre of the body. On the chemical theory its power would become insensible by dilution, while on the germ theory, it "grows by what it feeds on," and thus is capable of indefinite propagation so long as appropriate pabulum is supplied.

It is certainly a curious fact that in the production of vaccine virus we seem to have a perfectly clear case—which may possibly prove to be but one of hundreds yet to be discovered—in which an organism receives at once a definite modification which it invariably thereafter transmits to its descendants. The virus of small-pox from the human body reproduces itself *specifically* in a second human body—in the third, fourth, and so on indefinitely. But if in one stage of its onward progress, the virus passes through the body of a calf, and then is returned to its human channel a wonderful modification is perceived. Is it a new species of virus, or a variety only? If only a variety, it would seem that on the principles of heredity we should, at least now and then, have a sudden case of atavism or revival of the pre-vaccine type. And again how strange that while vaccination does not produce small-pox, it comes so alarmingly near it, that, in one respect at least, it leaves the system of the subject profoundly and permanently altered, just as small-pox alters it, *sterilized* as far as the germs of small-pox are concerned; so of yellow fever and the group of children's diseases.

This theory involves an almost inconceivable fecundity and rapidity of multiplication of these disease germs. But the difficulty is rather apparent than real. We draw our analogies very naturally from familiar observations. Those who study the simpler forms of vegetable life, such as the algæ and fungi, find them endowed, seemingly according to the same law which prevails in animal life, with a power of reproduction in proportion to the lowly rank they occupy in the scale of being. Indeed, the spores of certain fungi, seem almost omnipresent—wherever a favorable condition exists they are found—but as they do not spring forth spontaneously, their sowing must be broadcast in a wider sense than has ever been given to that word of the field. Experiments of the most refined and ingenious character and multitudinous in number, performed in numerous places and by many persons, have placed this idea in the category of the demonstrated facts of science.

Following up the analogy of inoculation by the vaccine virus or that of small-pox, daring investigators have not been wanting who have attempted to produce other forms of disease by a similar method, and it has been claimed that diphtheria has been unquestionably produced by transplanting a minute portion of the diphtheritic membrane to the throat of a healthy person.

Every day's observation suggests new modes in which it is possible, nay, certain, that these germs of disease migrate from system to system. They may float to us on the air we breathe, in the water we drink. The infection of scarlet fever has been known to lie dormant in clothing for years. Articles that pass from hand to hand, such as books from a public library, or paper money, may be, and no doubt are, not unfrequently, the ready vehicle of disease. The cup that passes from lip to lip may bear a poison more dangerous than hemlock.

The march of the pestilence, awfully sublime, herein discloses its terrible secret. It has often been remarked that its rate of progress corresponds to that of the usual means of travel. The cholera was from August, 1830, to March, 1832, in traveling from Astrachan to Paris. In the fourteenth century the plague was three years in passage from Constantinople to Vienna. In these days the pestilence travels at the modern rate. In 1865 cholera took passage on a steamship from Alexandria to Ancona. In 1867 it went from Rome to Zurich in four days. Little matter what the direction of the wind, or of the rivers, cholera floats with the human stream along the world's great highways. With the dreadful memories of the yellow fever yet so fresh in mind, and the spectacle of the terrible pestilence now devastating Russia and menacing all the rest of the world, it is eminently wise to study well all that is known concerning these questions of such grave importance, and to recognize the fact that our high state of civilization incurs fearful perils if not penalties by the inflexible laws of the natural world. But it is to these very laws that we may look for protection when we come to understand them. Precisely this is what Sanitary Science aims to accomplish.

The globe is surrounded with a gaseous envelope many miles in thickness. This atmospheric ocean, which nowhere finds a shore, has its currents and its pulsating waves no less than the ocean of water lying beneath it. Dense at the bottom, the atmosphere thins away upward until it vanishes, by insensible gradations, into the vacuous realms of space. Vast as are the tracts of the upper air, and profound as are the abysses of the ocean, they are alike almost barren of life. The narrow zone, made up of the very lowest stratum of the atmosphere and the upper layer of the seas, is the zone of life, teeming with countless species of animals and plants.

It seems strange that, with such munificence of space, all possible life must be crowded into so narrow limits. Yet so it is. As you ascend the mountain you rise into a realm of scanty and struggling life. You approach the frontier, you have passed the "timber line," and only the more hardy and insignificant representatives of the floral world mantle the cold rocks with moss and lichens. The noise of the world's great uncaged menagerie dies away beneath you, and the silence about you is broken only by the feeble

hum of some arctic insect. The difficulty of respiration in so rare a medium and the chilling temperature remind you that you have transcended the limits of comfort, if not of life.

The delicate adjustment of the atmosphere to all life, in its temperature, its density, and its composition, is but faintly indicated by observations such as these.

Let us limit our consideration to the relation of the air to the vital functions of our own species. If you could spread out into one sheet the exquisitely thin, transparent membrane, which, so curiously infolded and involved, you call your lungs, it would be ample to cover one side of quite a respectable apartment. Coursing over every portion of this voluminous membrane is the mazy net-work of pulmonary blood-vessels, divided and sub-divided down to microscopic size, through which, nevertheless, your fifteen or twenty pounds of blood must be driven continuously and with a surprising velocity. As these two tides beat upon this thin dividing wall—the tide of the invisible air and that of the blood—both are profoundly changed, the latter taking the hue of scarlet and becoming enriched with oxygen to be carried to every fibre of the body, kindling in it warmth and vitality, the former losing its life-giving power and becoming noxious and deadly.

Every one knows how instantly life ceases when the air, for any cause, fails to reach the lungs. In that case the blood returns, as it must, but carries poison and death, instead of life, to all parts of the system. If such be the case, then all causes affecting the quality of the air we breathe must correspondingly affect its power to vitalize the blood. All intelligent care in providing the lungs with a supply of pure air, in sufficient quantity, must take into account its physical and chemical properties. Especially is it important to remember that one of its most remarkable properties is its disposition to blend itself with all other gaseous bodies, however unlike itself. It descends to meet those heavier, it rises to join those lighter, than itself. Gravitation seems to lose its charm in the presence of a higher law of gaseous diffusion. The atmosphere thus receives all emanations, however poisonous, from all sources, dissolves them in itself, and by its wonderful alchemy speedily transforms them into ministers of life and health again.

One of the most difficult problems of Sanitary Science is to devise detailed methods by which, in the exigencies of a variable climate, and of the varied occupations of civilized life, every pair of lungs shall be regularly supplied with pure air of suitable temperature and humidity. This may seem an ideal condition—a desirable impossibility, yet plainly no wise attempt at the maintenance of perfect health can aim at anything less. For aught we know, each cubic inch of the whole volume of the atmosphere may have been breathed over many, many times since the race began, yet certain it is that no cubic inch of air which has been expelled from the lungs, fresh from playing scavenger to the blood, is fit to be taken into the lungs immediately. Look at your lamp as it burns quietly on the table before you. There is more than a poetical analogy between it and the lamp of life. You and it alike are consumers of oxygen. A simple experiment, which you may have seen performed, or which, if you have not seen it, you may easily perform yourself, will afford an impressive illustration of this point. Fill a glass jar with water, invert it in a larger vessel of water, then, by a tube of any sort force a stream of air from the lungs under the mouth of the jar until it is filled with respired air. Slip a cover under it and place it on the table. Light a short piece of candle attached to a wire, remove the cover of the jar and at once thrust the burning candle into the jar. It is immediately extinguished, showing that the air in passing once through your lungs has been so largely robbed of its vitalizing oxygen that it can no longer sustain the feeble combustion of a candle. Certainly it could no longer suffice adequately to purify by oxidation the tide of life that pours into your lungs every instant.

Every light of whatsoever sort which makes our homes bright at night, every source of heat we employ to mitigate the severities of our wintry climate or to furnish motive force to our multitudinous machinery, is a draft upon the same atmospheric capital upon which the warmth and motion of our own bodies depend.

I do not purpose in this talk to discuss in detail the difficult question of ventilation. Few questions of engineering and architecture are more complicated and intricate. A still more difficult matter, I apprehend, is to make the necessity of ventilation fully comprehended by the public. When it is comprehended, the modes of its accomplishment will be demanded with an earnestness that will accept no negative. Architects and engineers will be quick enough to take in the situation, when the question takes its proper prominence in the specifications which are made imperative by those who are going to build.

How many cubic feet of air are you willing to accept as a minimum supply for a long night's voyage on the sea of oblivion? How careful are you to make provision for the escape of that which you have once breathed and for the admission of that which would bring sweetness to your sleep and vigor to your awakening, if you would permit it? Drop into the crowded school-room some stormy afternoon, and see what you think of the quality of the air you find there and how well it is adapted to make young blood sweet and pure. In churches and assembly rooms pure air seems often to be held as something dangerous and noxious if we regard the seemingly studious efforts made to exclude it. It would seem that a mere sense of common decency, and much more any intelligent thought of the inevitable effects upon health and life, would demand the abatement of such abominations.

I have spoken of the atmosphere as furnishing us, when it is received in its purity, one of the prime conditions of health, but it may also become the vehicle which shall bring to us poisonous exhalations with which it may have been loaded, or it may bear the invisible germs of infectious diseases ready to take root in any congenial soil and produce their harvest of disease and death. It is a singular fact that every human habitation becomes a centre of possible danger to itself and to others. Despite the all-purifying and diluting power of the atmosphere, the products of decomposition resulting from the waste of every household are always a source of danger, and their disposal should be a matter of careful and incessant attention. Especially are the "modern conveniences" attended by a fearful following of perils and penalties. In how many elegant houses does the faint but alarming hint of sewer air greet you at the door. From chamber and bath-room the ingeniously constructed net-work of pipes is professedly for the purpose of carrying away the waste of the household, but really serves well its unintended use of conducting into every room of the house the poisonous gases resulting from the decomposition of this same household waste as it goes on in the sewers of the street to which hundreds of other houses besides are tributary. These outlets of visible household waste become the inlets of indescribably foul air, and with it the germs of malaria, diphtheria and possibly of other forms of zymotic disease.

No facts have been more thoroughly settled by Sanitary Science than that the quality of the water used for domestic purposes affects the health, and that water is often the vehicle by which disease enters the body. The necessity, therefore, of looking well to the quality of the water-supply is of great importance. Unfortunately it is no easy matter to judge of the quality of water by the senses, the

public faith to the contrary notwithstanding. Pure water—in the absolute sense of that term—is an ideal substance. Neither in the bubbling stream, in the flowing streamlet, nor at the bottom of the coolest and deepest well is it to be found. It is the exclusive property of the poets. There is some slight compensation for the universal lack of this ideal article in the fact that as its effects on the human system have never been tested, it cannot, therefore, be assumed that it would be perfectly suited to our wants if we had it. Why absolutely pure water cannot exist in nature, is easily understood when we think of its most striking properties. Bland and tasteless as it is, it possesses wonderful powers. More nearly than any other fluid, it answers to the alchemistic notion of the Alcahest—the universal solvent. Few substances perhaps absolutely resist its action, whether solid, liquid or gaseous. As it distils from the great alembic of the sky, and falls in gentle showers, it absorbs the gaseous impurities of the atmosphere and sweeps down with it the various emanations, gaseous or solid, which have arisen from the earth. The summer shower and the winter snow bring down not only moisture, but also fertility, to our fields. How sweet and clean, we say, is the air after a rainfall in summer. And so it is, but what of the rain? Correspondingly foul—it has washed the air of its impurities.

When the rain reaches the earth, already slightly impure, its solvent power is actively exerted on everything it touches. Whether it flows away over the surface or descends by filtration through the soil, it takes up whatever is most soluble until it is saturated, and even then it may deposit one substance to make room for another. Thus the surface of the earth, as well as the air, is constantly washed by the rains, and since, in this region, the annual rainfall is nearly four thousand tons of water per acre, it is on a vast scale. It is plain that the quality of the waters of any country must depend directly on the qualities of the soil and rocks over which they flow or through which they filter. Everybody knows that water is *soft* where limestone and magnesian rocks are absent, and *hard* where they are present. Much also depends upon the compactness of the rocks as well as upon their composition. In the older geological formations, where the rocks are more crystalline, they are less soluble than in the newer formations where the solidification is less complete. For this reason general differences exist between the water of the northern and southern states. For the same reason the waters of England and western Europe are highly charged with mineral matter.

The savage has little need for water except to slake his thirst, but with his progress in the amenities of civilized life man's necessities for water in greater abundance grow more numerous and imperative.

Thus far I have considered only such qualities of water as may be due to topographical and geological conditions. But a much more serious alteration in the quality of the domestic water supply is that caused by human instrumentality. Here man is his own enemy, and not infrequently a fatal one. Each human habitation is almost unavoidably a source of pollution to the water in the soil beneath it, yet this is the store from which the daily supply is usually drawn. It seems to be forgotten that water flows downward, that it carries with it a little of almost everything it touches, that organic matter undergoes decomposition underground, and, in short, that the water we daily use should be clearly beyond all intelligent suspicion. If water is odorless, and especially if it is clear, it is usually satisfactory. It matters less about the taste—people become accustomed to almost any flavor and when once habituated to it prefer it. One accustomed to hard water pronounces soft water flat and unacceptable. People would be horrified at the mere thought of drawing their supplies from the sewer of a city, but cases have been known where, over large areas, the ebb and flood of the wells kept time with the ebb and flood of the neighboring sewers. Cases have also occurred in which the deepening of a sewer has drained the wells along its course, not so much to the alarm of the owners at the revelation of a communication between them, as to their indignation at the loss of what was really only a source of danger. The usual remedy has been an act of retaliation, to deepen the well and drain the sewer into it.

In crowded cities, with even the best sanitary regulations everywhere enforced, the contamination of the soil is inevitable, and from a contaminated soil it is vain to expect to draw pure water. How often in city, village and country are cess-pool, water-closet, stable and sty horribly close neighbors to the well! As the well reaches the lowest level, all drainage will flow toward it, and inevitably into it, while the law of gravitation reigns. The deeper the well the greater, therefore, may be the danger.

In addition to household contamination of water, another cause of great importance exists in various manufacturing processes incidentally producing large quantities of waste matter, which usually finds its way more or less directly into the nearest stream. As cities must often depend on the adjacent river for a water-supply, the protection of its current from pollution, by the inhabitants of towns and villages situated above it, becomes a serious problem. So much anxiety has this question awakened in England, and especially in London, depending chiefly on the Thames, which is little better than an open sewer, carrying to the sea the drainage of several millions of people, that some years ago a Parliamentary Commission was organized, embracing some of the most eminent scientific men of the kingdom, to investigate in the most thorough manner the whole question of the domestic water-supply of the country. The work of this commission has made large contributions to our knowledge on this subject. Its general showing is not a cheerful one, but it gives a sufficient reason for the existence of much suffering, disease, and death.

It especially emphasizes one important fact. Evidently with a view to render the people of London satisfied with the Thames water, which is furnished to them by several corporations, the doctrine had been advanced and ingeniously and persistently argued, that the natural processes of purification are very rapid; that the organic matter, however abundant or offensive, is speedily oxidized by the air held in solution by the water, and transformed into harmless compounds. The conclusion of these ingenious arguments is to the effect that owing to this spontaneous process of purification, there can be no permanent defilement of rivers, and that the water of the Thames at London is "good in quality and perfectly wholesome." These arguments have occasionally been reproduced in this country to influence the choice of a water-supply. In reply to these specious arguments, the commissioners, in their last report, after detailing a large number of elaborate investigations, conclude by saying: "We are led in each case to the inevitable conclusion that the oxidation of the organic matter in sewage proceeds with extreme slowness, even when the sewage is mixed with a large volume of unpolluted water, and that it is impossible to say how far such waters must flow before the sewage matter becomes thoroughly oxidized. It will be safe to infer, however, from the above results, that there is no river in the United Kingdom long enough to effect the destruction of sewage by oxidation." The natural process of water purification is probably the only really efficacious one—namely, evaporation and recondensation in rain and snow.

No one will doubt that the use of contaminated water must be prejudicial to health. Less certainty, however, is felt in the assertion that the water we drink often serves as the vehicle by which positive disease enters the system. Sanitary literature furnishes multitudes of cases in which

the outbreak of such diseases as cholera and typhoid fever has been as distinctly traced to a contaminated well, as an outbreak of small-pox could be referred to an infected person. In all places where large numbers of persons are brought together with inadequate means of drainage, as in summer hotels, especially at the seaside, in boarding-schools, and camps, sudden outbreaks of typhoid fever are unfortunately of frequent occurrence, and in many cases the immediate cause is found in contaminated water. Not long since, in the city of Rochester, within a few weeks, fifty cases of typhoid fever, or closely related disease, were reported to the Board of Health. An energetic investigation followed, which showed that all these patients, except two, used well-water instead of the supply drawn from Hemlock lake. From all these wells, forty in number, the water, upon examination, was found to give unmistakable evidence of sewage contamination. Another instructive case has been lately reported in the city of Syracuse by Dr. Van De Warker. A citizen returned to his home ill of typhoid fever. Within six weeks, sixteen cases followed in the immediate neighborhood. A most skillful examination of all the facts in the case showed that all the persons attacked had used water from the well near the cottage of the first patient, that this well had evidently been liable to contamination from excrementitious matter, and that the occupants of other houses in the same neighborhood, though coming into frequent contact with the sick, but not using water from the well above mentioned, were in no case attacked with the disease. The chain of evidence, connecting every one of these cases with a contaminated well, is complete.

It may be reasonably asked what precautions can be taken against such insidious attacks of disease. I answer, in general, such precautions as you take against any other insidious enemy. The same kind of persistent, patient investigation which is employed to detect the perpetrator of larceny, arson, or murder, will generally lead to a safe conclusion as to your safety or danger. Wells near dwelling-houses, which is necessarily the case in villages and cities, can hardly be considered free from contamination in any case, and, if contaminated, are certainly unsafe. In the country, they may be put at a safe distance, but in the determination of this question the character of the soil and the direction of the movement of the underground water should be fully understood. The underground stream that supplies your well may possibly be the natural sewer of your neighbor's house.

The inference from such cases as those mentioned above is that water is often the vehicle for the disease germs which thus invade the system and produce their specific forms of disease. But the water we drink may be the medium of quite another sort of trouble concerning which there is no room for the hypothesis. I allude to the contamination of water by lead pipes. Those who have given attention to the matter assert that cases of lead poisoning from this cause are of far more frequent occurrence than is usually supposed. The well-known fact that lead is not eliminated from the system, as are most other poisons, but accumulates until the quantity becomes sufficient to procure grave results, should induce more attention to this matter than it usually receives. Lead should never be used for water-pipes. Nor is this the only source of danger. Lead is largely used in the manufacture of the so-called tin-plate. Tin roofs poison the water which flows into the cistern. Culinary vessels made of "tin" thus become objects of suspicion. The Michigan State Board of Health, in their last report, call special attention to the danger arising from the use of lead pipes, tin-plate adulterated with lead, in roofing, and in culinary vessels, and in earthenware with lead-glazing. The poorer classes are especially exposed to these dangers and should be protected.

THE WORLD OF SCIENCE.

We are told that there was a time when the matter which composes this world, as well as that which is in the sun, moon, and other planets, was in a state of chaos—that is, in one mass together—and that out of this confused mass, the earth and other planets were gradually developed. Let us imagine that we are now looking out upon this world for the first time, and in total ignorance of all the facts which make up science.

But what is science? Literally the word means knowledge, or things known. But there are many subjects about which much is known, which we do not ordinarily speak of as sciences. For instance, much is known about music; and yet commonly speaking, we call music an art. But really it is both a science and an art. The difference between art and science is, that art implies practice, while science depends upon abstract or speculative principles. The theory of music would be a science, while the practice of it would be an art.

When we talk of any science we do not mean that all it is said to teach is positively known to be true. Often much of it is theory, or what men suppose may be true, though it has not been proven. So that when men talk of the conflicts between science and the Bible, they are talking about the theories of men which are called science, but some of which may yet be shown to be false. Scientists themselves are not settled in regard to some of them, and their opinions are continually changing.

Let us now look out upon the earth for the first time. The sun has risen in its splendor and the earth is bathed in the soft light of the new morning. Hill and valley, meadow and woodland, rock and stream are all baptized in the same ineffable glory. Let us go forth. For a time the eye wanders, trying in vain to drink in the entire scene of beauty. But amid all these bewildering objects, there is nothing upon which the eye rests with more pleasure, than upon the almost endless variety of trees, shrubs, grasses, and flowering plants, which cover every hill with their verdure and adorn every rod of the vast area before us, with their beauty. Let us look at these. Here are trees of almost endless variety, with leaf as varied as their forms, and blossom and seed as widely differing as either. Many of them we observe are bearing fruit. But how different in shape and size and color. And if you venture to taste them, you will find the flavors as varied as the appearance. If you cut into the trunks of these trees you will find the wood differs as widely as any other part of the tree. Some are very beautiful in their structure and of the richest colors. Some are very hard, while others are quite the opposite. Some are never found except upon rocky soil; others always upon sand. Some always found upon the edge of streams or other bodies of water, while others are never found near water. The question comes to us, whence these remarkable differences? Do these trees grow at random—in any shape or in all shapes? May the apple bear peaches next time? Will the persimmon be rich and juicy like the pear some day? Will the rose be mottled like the lily, or have an odor like the poppy, some time in the future? If we continue our search we shall find that the oak and the maple, the chestnut and the apple, each grows from a peculiar seed, which is deposited in the earth. Moreover, it will be found that the peach or the plum tree never comes from the seed of the apple—that nature never makes mistakes of this kind. No man ever sowed a field of wheat and harvested from it a field of barley. These things, though remarkable, have been so from the beginning, with never an exception. Moses said, by the direction of God, 4,000 years ago: "Let the earth bring forth grass, the herb yielding seed, the fruit

tree yielding fruit after his kind, whose seed is in itself, upon the earth. And the earth brought forth grass, and herb yielding seed *after his kind*, and the tree yielding fruit, whose seed was in itself, *after his kind*." Gen. 1: 11-12. We shall find if we continue our search, that trees, shrubs, fruits and flowers, have properties which differ as widely as their appearances. Some are poisonous, others harmless. Some fruits are nutritious and delicious for food, while others are tasteless or disagreeable. Many of the plants have properties which make them valuable for medicines. Now it is by finding out these different properties and putting together such trees and plants as have the same or similar properties and characteristics, that men have been able to group them into classes or families. They have found by careful observation, that there is a tree which they have called the oak which always has the same characteristics, no matter where it is found. This tree has a leaf which is peculiar, and it is never found with any other kind of leaf, nor is exactly the same kind of leaf ever found on any other kind of tree. The oak has other characteristics, which are peculiar to itself. But we shall find that there are different families of the oak. We shall find classes with the general peculiarities of the oak, but with other characteristics which distinguish them from the common oak. Still these differences are not sufficient to justify us in calling the tree by any other name than that of the oak. For instance, we shall find in Florida, the "Live Oak," so called because it is an ever-green, that is, its leaves do not drop off as they do from the oak in colder climates. But in other respects it is so like the common oak that we cannot call it by any other name. So we have different kinds of maple trees. There is the rock or sugar maple, and the soft or white maple, and still other kinds which make distinct families of the maple. The same is true of shrubs and smaller plants. Now it is by observing these peculiarities in trees, shrubs, and plants, that men have been able to separate them into different classes and so reduce the study of the vegetable kingdom to a complete system. The vegetable kingdom embraces everything which grows up out of the earth—from the tallest tree to the smallest grass or flower. What men know about this vegetable kingdom is called the *science of* BOTANY. So when we study to find out these things we are studying Botany. The word Botany is from a Greek word, *botane*, which means an herb or plant; and the science of Botany tells of the structure of plants, the functions of the different parts—that is, what each part of the plant has to do—the places where they grow, whether on the mountain or in the valley, on dry or moist land, in warm or cold climates, the families or groups into which they are gathered, and the names by which they are described. In short, Botany includes everything known about plants. It is a study full of interest, and many great men and women have given their whole lives to the study of it. You can hardly imagine the many years of hard labor which it has cost to gather the facts which we now have. Perhaps you may wonder what good can come from so much study of this science. Let us see. Many plants, as you already know, furnish food, while others are used for medicine. It is very important that we know what kinds are wholesome for food, so that we do not eat those which are injurious. It is equally important to know the medicinal properties of such as can be used for medicines. When you show a plant to a good botanist, he will tell you at once whether it is poisonous or not and whether or not it has medicinal properties. If you give him a flower he will tell you on what kind of soil it grew, and give you a complete history of the plant which produced it. It is exceedingly pleasant to ramble through the fields with such a guide and name the flowers and plants which you find and tell their history. It is like walking among old friends. Every flower becomes a personal friend when you call it by name and give its family history. I remember crossing the Green Mountains from Vermont into New York, with such a friend, some years since. We spent much time in rambling in the fields, among the rocks, and alongside the mountain streamlets, examining and classifying the rare plants which grew in that mountainous region. We found a great number which we had never seen before, and two or three of which we could find no description. The long journey, which might otherwise have been lonely and tedious, was made delightful; and I think of those uninhabited wilds to-day, as being filled with the smiling faces of cherished friends. It would be a pleasure to go over the same route again, and renew acquaintance with those friends of long ago.

But we must not linger too long among the flowers and trees.

All along our journey through the fields we have been stumbling over stones, clambering over ledges, wandering through valleys, and climbing up hillsides, without for once stopping to ask, how came all this? Whence these long ranges of hills and mountains? How does it happen that they run so nearly in the same direction? Why is not the entire face of the earth one plain flat surface? As we study the structure of the earth, as we look at the stones which lie scattered over its surface, as we examine the different ledges of rocks, and especially as we dig down into the earth as men have done in mines, for hundreds and even thousands of feet, we shall find many curious things. We shall find that almost the entire body of the earth is rock—that the soil upon the surface of the earth reaches down but a few feet in most places. As we dig down we shall find that the different kinds of rock, such as granite, limestone, sandstone, etc., lie one upon another in regular order, and always in the same order. I mean that we do not find granite at the bottom in one place, with limestone above, and limestone at the bottom in another place, with granite above it, but, in their natural beds they are always found in the same order. Of course we shall find different kinds of rocks in different places. For instance, in England we shall find what is called the chalk formation—a kind of stone like the chalk we use, and from which it comes. Those who have come from Paris to London via Dieppe will remember the high ledges of rock all around the shores of the English Channel at Dieppe, which look like high walls of white marble. We do not see this kind of rock in this part of the world. And we shall find some kinds of rock here which are never seen in England.

For the last fifty years men have been studying hard to find out how these different kinds of rock came into existence, how long they have been in existence, and all the circumstances connected with their origin. They have been able to determine with some degree of certainty, how long it must have required to deposit some of these kinds of rock, and so have made some estimates in regard to the age of the rocks. They have determined that all the rocks were once on a plane, that is, they were flat, and parallel with the level portions of the earth. They have ascertained that the mountains and hills have been produced by some enormous pressure in the earth, which has thrown up its surface in places, so as to produce hills and mountains. By careful observation men have been able to tell how long it has been since certain ranges of mountains were lifted up. They have found out that these or similar changes are going on continually in some parts of the earth. Occasionally a new island is thrown up in the sea. Then another island will sink out of sight. Some islands now inhabited have come up out of the sea within the last few hundred years. Not only are these changes going on among mountains and islands, but we know that much of the land which is now covered with

fields of grain, or perhaps with populous cities, was once covered with water. The whole valley of the Nile, which is among the richest valleys on the earth, was covered with water a few hundred years ago.

By careful examination we shall find that the different kinds of rocks are widely different in their structure. Some show that they have been deposited by water, and then have grown hard by pressure, or by the influence of the sun, or heat from some other source, just as clay would grow hard if pressed or exposed to heat. Others show that they have been exposed to a more intense heat; while others, like chalk and marble, are composed of countless numbers of shells of small animals, which have died in the ages which are gone. The science which tells about these and many other curious things is called GEOLOGY. The word means a treatise or discourse about the earth—from the Greek words, *ge*, the earth, and *logos*, a discourse. The science of Geology, then, tells what is known about the earth. The difference between Geology and Geography is, that GEOGRAPHY tells us only about the surface of the earth as we see it now, while Geology includes not only the surface, but the whole bulk of the earth, and tells its history from the beginning. That particular part of Geology which treats about the rocks or minerals, is called MINERALOGY. The word means a treatise upon minerals. There is much connected with the science of Geology which is not positively known. Many theories about the age of the rocks and the earth, theories concerning the condition of the rocks as we approach the center of the earth, whether melted or not, cannot yet be positively settled. Some of them are mere conjectures, and scientists themselves are not at all agreed in regard to them. But it is a most fascinating study. If Botany adds interest to every walk through the fields, Geology will double that interest at least. So that with a knowledge of these things, we shall never find ourselves alone. There is no solitude to the student of nature.

If, in our wanderings, we have made our way to the seashore, you will doubtless have been delighted with the many rare and beautiful shells which we have found scattered here and there along the shore. Some of these are of marvellous beauty, excelling in their brilliancy, even the richest colors of many of the rarest flowers. We cannot stop with these long; but I promise you that when you find time to gather a variety of these beautiful shells, whose brilliancy and exquisite polish even the salt sea water does not tarnish, and make a careful study of them, you will be fascinated as you rarely ever have been with any study. If young people knew how much real enjoyment they could find, by having some specimens of rock, a collection of shells, and another of plants, to study, and classify, and name, in their hours of leisure, they would never sigh for sources of enjoyment. I have known a boy eight years old to spend hours of perfect delight, during the days and evenings of a long, cold winter, with his cabinet of shells. The science which tells about this is called CONCHOLOGY. The name is from the Greek words, *konche*, a shell, and *logos*, whose meaning you already know.

But, how often, as we have wandered, has our attention been turned toward some strange or beautiful animal, or some rare or sweet singing bird. What an almost endless variety of these animals, both great and small! Beautiful or ugly, ferocious and cruel, or timid and harmless, lazy and never caring to move, or always in motion and as fleet as the wind. So we shall find that their habits vary as widely as their appearance. One thing which seems a little strange is the fact that while these animals are all loose and at liberty to go where they please, they do not wander far. Every animal seems to have his home. You will find one always upon the tops of mountains among the crags, while another will rarely or never leave the deep cuts between the mountains. The different kinds of animals are seldom or never found together. Those which are of the same kind, even, do not always associate; though some, like the deer and moose, are sometimes found in companies. The study of animal life is full of interest. Some animals show a degree of intelligence which is really surprising. The habits of the small insects such as the spider and ant are as strange as anything in the lives of men. We shall find things just as strange if we study the habits of the birds. Many things, both in animals and birds, make them seem almost human—in fact superior in some respects to many human beings. The affection which almost all the lower animals show for their young—the real gallantry which the male manifests in protecting the female, and the almost more than human regard which he has for her desires—the fidelity which many animals show toward those whom they regard as friends, together with many other peculiar manifestations, invest the study of these animals with rare interest. The science which treats of the animals is called ZOOLOGY; while that which tells us about the birds is known as ORNITHOLOGY. The name Zoology is from the Greek words, *zoos*, an animal, and *logos*. The meaning, as you will see, would be, a treatise about animals.

The word Ornithology means a treatise upon birds—from *ornithos*, a bird, and *logos*.

Thus far, these rambles have not been tedious, I trust. And yet we have often been interrupted by a shower, or a threatening sky. Sometimes the clouds have brought rain, when to us there seemed very little prospect of it, and we have been drenched by an unlooked-for storm. At other times when we have deferred our ramble on account of the threatening aspect of the clouds, they have suddenly melted away, and a gloomy morning has been followed by a charming day. But we have lost the day because we feared the storm. How much trouble it would have saved us, if we could have known from day to day, just what the weather would be on the next day. You remember, perhaps, that in the old almanacs which we used to see when children, there was an attempt to tell what the weather would be day by day. But they knew very little about it, and hence were wrong as often as they were right. But it was so important that men should know about this if possible, that they continued to observe carefully, and study everything which would give any clue to this important secret. At last they found the cause of the winds, and then the cause of rain, snow, etc. They found out what would be likely to produce violent storms, where and how these storms generally originated, and which way they were likely to travel. They found that when a storm started in a given direction, whether east or west, it generally continued in that same direction until its force was spent. They could tell, too, about how long it would take for a storm to move from one place to another. So, then, if they could find out by telegraph where there were storms to-day, and which way they were moving, they could tell what places the storm would be likely to reach on the next day, and so on. To find out these things has required an amount of study and labor, of which you can have very little conception. The number of instruments which have been invented in order to make the proper observations to find out these things, would surprise you.

I knew one of these men, who died a few years ago, Mr. E. Meriam, of Brooklyn Heights, N. Y. He was almost the father of that science which tells so much that is valuable about the weather. He was a man of singular habits, as great men often are. I remember the last time I met him was at White River Junction, Vt. It was a very cold morning in midwinter, the mercury registering 25° below zero. He had ridden fifteen miles on the outside of a sleigh-coach. He told me that he had on no under flannels, and he wore

no overcoat. His coat was of common cloth and had not been buttoned during his ride. His hands were bare and his feet were protected by thin cotton hose and a pair of prunella gaiters which would weigh about four ounces. He declared that he had not felt the sensation of cold during his ride. He attributed it to the fact that he never ate or drank anything that was warm. He ate very little meat, and that as well as the potato must be cold. His drink was cold water only. He was then a man of about sixty years of age, of slight figure, with a face as pure and sweet as a child's, while he was as active and nimble as a boy of ten years. He told me that for more than fifteen years he had registered the state and temperature of the atmosphere, every hour, day and night—that when at home he arose every hour during the night and examined his barometer, thermometer, etc.

I wondered then, twenty-five years ago, what practical good was to come from such devotion and sacrifice. I ought to say it was no sacrifice to him—it was more than his meat and drink. We see now what good has come from this devotion and self-denial of the students of science, and how much the world owes to them. The science of METEOROLOGY, for that is the name by which we call this study, has been brought to its present perfection by just such patient and monotonous work as that to which I have referred. By this science, men to-day determine with such accuracy what the weather is to be for the next twenty-four or forty-eight hours, that the farmer can arrange his work to the best advantage, and the sailor has but to consult the weather-report to determine whether he must remain in port or may leave it. And if we were now starting upon our rambles for the first time, we could avoid excessive heat or storms.

The word meteorology is from the Greek word *meteora*, things in the air, and *logos*. Hence the meaning is, literally, a treatise upon things in the air. The science has come to be of so much importance that the government has established a department, for the purpose of making and reporting observations upon the weather. To-day, "Old Prob," is consulted and listened to by more people, than any other man in the nation.

We have now traversed the earth, and by rapid glances caught glimpses here and there, which I hope will awaken a deep desire for study. But we have seen but little of that world of mystery which is all about us. While looking at the animals and birds, we have trodden upon thousands of little animals too small to be seen by the naked eye. There are many wonders and beauties in the plants which cannot be discovered, because too small. Many of the rocks are made up of shells too minute to be seen by the unassisted eye. All over the earth, in water and air, in the rocks and flowers—a whole world of beauty and mystery has been passed by, because they have been too small and delicate to be seen, even by the keenest eyes. But men have found, first by accident, and then by experiment, that with pieces of glass of certain shape, put together in certain ways, they could make very small objects appear quite large. So, by these instruments thus constructed, they have opened to us another world—a world heretofore unknown. This instrument we call the microscope, from *mikros*, small, and *skopein*, to view—which means to view small things. We call the science which treats of all this, MICROSCOPY. You will find, bye and bye, when you have studied carefully all that is around you, that you still have the richest field before you—a field which can be studied only by the use of the microscope.

How often, during our rambles, has the sun gone down before we have reached our homes, so that we have found ourselves closing up the journey so full of incident and interest, by the light of moon or stars. How quiet and restful the earth has seemed under the weird light of these stars; as though she felt herself under the gaze of some thousand-eyed being, who was scanning her conduct. How we, too, have wondered what these bright lights are? When did they begin to shine? Who put them there, and for what? From the earliest days men have been asking these questions. Let us go out on this beautiful October evening and look for ourselves. Here are a thousand stars of different size and brightness. By careful observation we shall find that they are all moving; not in confusion and disorder, but with the most absolute and unvarying regularity—like a countless caravan, moving silently and forever along the celestial archway. If we are amazed at this, how will our amazement be increased when we find that this procession has never stayed in its course, since this light first shown upon Adam and Eve, as for the first time they walked forth in the garden of Eden. The shepherds as they kept guard over their sleeping flocks, in that far-off home of the infant race, watched the same stars and wondered whence they came and what their mission. They saw, as we do, that all these bright stars seemed to move in one direction—that they disappeared in the west, and reappeared regularly in the east. What strange thoughts must have been awakened in the minds of these rude men? What were these lights, forever burning, but never burning dim? What unseen power moved them in their eternal rounds? How far away were they, and what purpose do they serve? Every effort made to find out such facts, only impressed men deeply with the thought, that they were all governed by absolute laws. They have sought for these laws, with a devotion which has amounted to the most unconquerable enthusiasm. Were these placed in the sky for mere adornment? Or were they put there only to shed their feeble light upon the darkness of night? What message bring these silent watchers from the far-off regions of their abode? Are they the lights set upon the out-posts of the eternal city, defining its boundaries, which, like the midnight lights of some earth-born city, are declaring to us a habitation far away? Is this the beginning and end of their mission? These, and problems like these, have agitated great minds since first "the shepherds watched their flocks by night." Religious enthusiasm has joined hands with the ingenuity and research of science, to uncover and interpret these footprints of the Creator. Man with unaided eye could see their beauty and mark their movements. But all beyond this was hidden—mere conjecture. How men have longed to climb up to these stars, or by some means bring them down to us. Is there no way to bridge the chasm? Must we forever remain in this uncertainty concerning them? This anxiety has goaded men till they could not rest. Little by little, light has broken through the windows of science, and this longing has been relieved. Instruments have been invented by which the stars have been magnified, until it was almost like bringing them down to our very doors. By the aid of these instruments we are now able to measure, weigh, and compute the distance of the stars with as much accuracy as if they were in close proximity to the earth. In addition to this, we can see tens of thousands of stars, which are never seen by the naked eye. More than this; we have ascertained that many of these are great suns, shining by their own light, and like our own sun, illuminating other worlds beyond. These stars, which at first, appeared only like little evening lights, of the size of a candle, have been so changed that they now appear like great worlds, some of them many thousand times larger than our own earth, and perhaps as well adapted to be the habitation of other millions of intelligences. How this has enlarged our ideas of the universe in which we live! The study gives us new views of the greatness of God, and bring us nearer to Him. The instrument by which we have been enabled to accomplish this is

called the *Telescope*. The name is derived from *tele*, far off, and *skopein*, to see. Hence to see afar off. And the science which treats of all this is called ASTRONOMY—from *aster*, a star, and *nomos*, a law. Hence, the laws of the stars. No science is grander, no study more elevating. None better adapted to enlarge the mind or give wings to the imagination.

We have seen in our rambles how these studies of what are called the "Natural Sciences," cover every path with objects of beauty, and endow every natural object with characteristics of a personal friend. The student of science hears a voice in wind and stream, in rock and tree. Every flower smiles upon him, and every plant speaks to him in language which cannot be misunderstood. To him, animals, birds and insects are endowed with intelligence. Everything animate and inanimate, in water, earth and sky, talks in a language which is intelligible. He is never alone, never in search of something to amuse. He walks amid a world of beauty, and only yearns for time and strength that he may know it more fully.

We have now only stepped upon the threshold of the open door to the World of Science. We have had a glimpse at some of the principal studies sometimes called the PHYSICAL SCIENCES. We have traced their development, and seen a little of the effects of such study.

There remain such sciences as CHEMISTRY, and NATURAL PHILOSOPHY, which, with those already noticed, are often spoken of by the general name of PHYSICS, by which we mean the science of nature, and it embraces all that we know, or may know about the material world. In later years the term Physics has come to be used to signify that which was formerly embraced in the department of science called Natural Philosophy. Considered in this light, Physics treats of the properties of bodies, such as hardness, malleability, etc., and the causes, such as gravitation, electricity, etc., which modify these properties. Chemistry, which is often classified under the general head of Physics, differs from Physics in the narrower sense in which I have used it. The difference may be stated in this way: Physics treats of the phenomena of laws which govern bodies in masses, and of those effects which do not produce any change in the nature or composition of the bodies; while Chemistry treats of the phenomena and laws of the particles of matter, and of all those effects which produce changes in the properties and composition of material bodies. Chemistry is considered under two general heads: organic and inorganic. Organic treats of organized bodies, whether animal or vegetable; while inorganic treats of unorganized bodies, such as minerals.

But there are many other branches of study, which in a broader classification may be considered as sciences. There is the whole range of MATHEMATICS, which relates to whatever is capable of being numbered or measured. This is very properly called a science, because everything in Mathematics is susceptible of proof. One branch of Mathematics, that which relates to measuring the earth, is called GEOMETRY; from *ge*, the earth, and *metrum* or *metron*, a measure. Originally it implied only measuring the earth; but at present it is used in a much broader sense, viz: The science of extension; that is, of lines, or surfaces and solids. The Egyptians are said to have originated this science in this way. The river Nile is known to overflow its banks every year, and by this means it washes away all the boundaries or land-marks of men's estates. The owners were obliged to distinguish their boundaries by figures and by the quantity. By this means they became adepts in the art of measuring, and invented the science of Geometry. The methods by which the problems of Geometry are solved require the most careful processes of reasoning. This thought introduces us to another branch of study, which embraces the whole art of reasoning, called LOGIC. This is one of the seven sciences, viz: GRAMMAR, RHETORIC, LOGIC, POETRY, ANTIQUITIES, HISTORY and CRITICISM, which are called by the French, BELLE-LETTRES. Logic is usually defined as the art of reasoning, or the art which teaches the right use of reason. The word, *logos*, literally means, *to speak, a discourse*, etc. One writer says "logic is so called because thinking is only an inward mental discourse, wherein the mind converses with itself."

Besides these, there are the mental and moral sciences. The word mental is from *mens*, the mind, and MENTAL SCIENCE is that branch of science which tells us about the mind—its different departments, together with the laws which govern its action and its development.

The word moral comes from *mos*, which signifies a manner or custom. MORAL SCIENCE is that which teaches what our manners or actions should be. More specially it means our moral duties, or how we should act toward our fellows and toward our God. It is the science of right and wrong, and tells us of the various duties which grow out of the different relations of life, which we must perform in order to do right. This is often called ETHICS and ETHOLOGY, both of which mean the science of morals. The word Ethics is from the Greek word *ethos*, which means custom, manners, etc., and is synonymous with—means the same as —*mos*, in Latin, from which moral comes. There is still another branch of study, which may, with some propriety, be called a science. It treats of the beautiful—tells us what constitutes beauty; that is, what entitles a body to be called beautiful, the results of the study of the beautiful, etc. This science is called ESTHETICS, and embraces the theory of taste in all its bearings, whether upon things in nature, or in art. It also embraces that department of science known as Belle-Lettres.

Beyond all these, there is a branch of study, which in many respects is more important than any of them. I mean THEOLOGY. It is so called from the Greek words *theos*, a God, and *logos*. Hence the science which treats of God and divine things. It is generally treated in two branches: natural and revealed. NATURAL THEOLOGY is the knowledge we get of God by the light of nature and reason, in the study of His works as we see them around us. REVEALED THEOLOGY is that which is to be learned of God, of His plans concerning us, and of our duties to Him and to one another, as they are revealed to us in the Bible.

In the treatment of this subject thus far, I have almost necessarily passed over some important branches of science, such as MECHANICS, PHYSIOLOGY, PSYCHOLOGY, METAPHYSICS, POLITICAL ECONOMY, etc. It would be interesting to trace the history of each of these, and see how like the other sciences they have grown, little by little, out of the necessities of man. But that would make this paper far too long. So I shall only give you the briefest definition of these possible.

MECHANICS is the science of motion, that branch of practical mathematics which considers moving forces, their nature, and the laws which govern them. That part of the science which treats of forces acting upon other bodies so as to produce rest is called STATICS; from *sto*, to stand. That which treats of forces acting so as to produce motion, is called DYNAMICS; from *dunamikos*, which means power. The term Mechanics includes the action of forces upon liquids and gases, as well as upon solid bodies. That part of the science which has reference to liquids is called HYDROSTATICS; from *hudor*, water, and *statikos*, to stand or weigh; and it treats of the laws which govern liquids. Strictly speaking, Hydrostatics would treat only of those laws which govern liquids when in a state of rest, while those laws which relate to liquids in motion, would be called HYDRODYNAMICS.

The term PHYSIOLOGY, which relates to another department of physical science, is used also both in a broad and narrow sense. When used in its broad sense, it signifies the laws which control the works of nature. But in its narrower and more common sense, it means that which treats of the organs of animals and plants, and their functions or uses.

There remain now but two or three branches of science to which I shall allude. An important branch is called METAPHYSICS; which means literally, after or beyond nature. It is from *meta*, after or beyond, and *phusikos*, natural or physical. It is generally believed that Aristotle gave it this name, because he thought the physical, or things relating to nature, should be studied first; and afterwards those things which relate to mind. Hence we will call Metaphysics the science which relates to the phenomena of the mind. It is only another name for Mental Philosophy.

PSYCHOLOGY is sometimes used in the same sense, though strictly it signifies a treatise upon the human soul, showing what it is so far as can be determined, and the laws which govern its action. The word is derived from *psuke*, a soul, and *logos*.

A branch of science, which is called POLITICAL ECONOMY, should be well understood by every citizen. It treats of the laws which are to govern men in their civil and political relations; the laws which govern trade, the sources of wealth and prosperity, and the methods of securing them. These principles underlie and control all good government, and hence it is important that they be carefully studied by every good citizen. Then there are laws which relate particularly to the social life of man—to the development and elevation of the social nature. The science which treats of this may be called SOCIOLOGY, though the word as used by Herbert Spencer and some other writers has a somewhat wider range. The social nature of man, though rarely referred to by writers, is one of the most important elements in the nature of man. This element is one of the most powerful, and enters largely into all those efforts which give one man power over others. The problems which grow out of the social nature are of all problems the most difficult to solve. Hence it will be well for society when this branch of science shall receive more careful attention.

Here, then, as though standing within the charmed circle of this Panorama of Sciences, I must leave you to your own reflections; but not without the hope that you may have received some impulse, which will give additional inspiration to your study in the future.

THE telegraph companies are threatened with a new rival. The telephone exchange is the new candidate for use and honors. "Lowell, Mass., is connected with over one hundred cities and towns in the States of Massachusetts, New Hampshire and Rhode Island. The longest circuit is from Springfield, Mass., *via* Worcester, Fitchburg, Lowell, Lawrence, to Exeter, N. H., over 150 miles, which is worked successfully. The telephone business between Boston and Lowell, a distance of twenty-six miles, amounts to $3,000 annually. The Lowell District Telephone Company, which owns and operates the systems of Worcester, Lowell and Fitchburg, and the lines of the Northern Massachusetts Telephone Company, use 2,500 telephones, and pays the American Bell Company a monthly royalty of over $1,200. The company controls over 1,500 miles of wire, and employs in all divisions about one hundred persons."

ANY engagement that is innocent is better than none—as the writing of a book, the building of a house, the laying out of a garden, the digging of a fish-pond, even the raising of a cucumber or tulip.—*Paley*.

INTRODUCTION TO THE SCIENCES.

[CONCLUDED FROM MAY NUMBER.]

45. The Phenomena of Heat are the Effects of a rapid Motion of the Particles of Matter. This much, however, is certain: that heat can be caused by motion. Every boy knows that a metal button may be made quite hot by rubbing it. A skilful smith will hammer a piece of iron red hot. The axles of wheels become red hot by rubbing against their bearings, if they are not properly lubricated; and even two pieces of ice may be melted by the heat evolved when they are rubbed together. And there are abundant other reasons, as you will find when you study physics, for the belief that the sensation that we call heat, and all the phenomena which we ascribe to heat, are the effects of the rapid motion of matter.

However, a quiescent body may be made hot without exhibiting the least appearance of motion. The surface of the water in a tumbler at 100° is just as unruffled as that of the same water at 32°. What, then, is meant by saying that heat is a kind of motion, and that the greater the heat in any body the greater the amount of motion in that body?

The answer to this question is that the motion which causes the phenomena of heat, is not a visible motion of the whole mass of the hot body, but a motion of the individual *particles* of which it is composed. And each particle moves, not straight forward, but backwards and forwards in the same space, so that its motion may be roughly compared to that of a pendulum, or to that of the balance-wheel of a watch. It is in fact a sort of *vibratory* movement; each vibration taking place through a very short distance and with extreme rapidity. The sensation of heat is caused by the vibratory movements of the particles of matter, just as sound is so caused. The prongs of a tuning-fork which has been struck, certainly vibrate, for you can see them do so if the note is low. If you now put your ear at one end of a long piece of timber and the handle of the vibrating tuning-fork is placed upon the other end, the vibratory motion of the tuning-fork will be communicated to the particles of the wood and will be loudly heard. All the time the sound is heard the particles of the wood are vibrating. Nevertheless, the wood as a whole does not move, but its particles swing backwards and forwards through such a minute space that their motion is imperceptible.

But what are these *particles* of matter which by their vibration give rise to the phenomena of heat?

46. The Structure of Water. We have seen that pure water is perfectly clear and transparent. The naked eye can discern no difference between one part and another. In other words, it has no visible texture or *structure*. It does not follow that it really possesses none, however, for there are many things which seem to be the same throughout, or *homogeneous*, which yet show structure if they are examined by a magnifying glass. Thus the surface of a sheet of fine white paper looks perfectly even and smooth to the eye; but a magnifying glass of no great power will show the minute woody fibres of which it is made up; while, under a powerful microscope, the paper looks like a coarse matting.

But if we put a small drop of water on a slide, such as is used for microscopic objects, and cover it over with a thin glass so as to spread it out into a film, perhaps not more than 1-10,000th of an inch thick, it may be examined with the very highest magnifying powers we can command, and yet it looks as completely homogeneous and shows as little evidence of being made up of separate parts as before. However, this is still no proof that the water is not made up of little parts or particles, distinctly separated from one another. It may merely mean that the particles are so extremely small that they cannot be distinguished even by microscopes which magnify four or five thousand diameters.

It is certain that solid bodies may be divided into particles so minute that the best microscopes show no trace of them. Common gum-mastic cannot be dissolved by water, but it readily dissolves in strong spirit of alcohol, and mastic varnish is an alcoholic solution of gum-mastic. If you add water to mastic varnish, the alcohol takes away the water and the mastic falls out, or *precipitates*, as a curdy solid composed of very visible whitish particles. But if a drop of the varnish is added to a good deal, say half a pint, of water and well stirred at the same time, the mastic, though it is still precipitated as a solid, is in a state of extremely minute division. No separate solid particles of mastic are visible to the naked eye, but the water assumes a faint milky tinge.

The milkiness arises from the presence of solid particles of mastic diffused through the water; and yet, if the experiment has been properly managed, a drop of the fluid may be spread out as before and examined with the highest magnifying powers, and nothing can be seen of such particles. So far as vision goes it might be a drop of pure water. Now our best microscopes are able to show us anything solid which has a diameter of 1-100,000th of an inch, quite distinctly; and probably solid opaque particles of much smaller size would make themselves apparent as a turbidity or cloudiness. The particles of mastic must be therefore so much smaller than this that they remain invisible. Hence it follows that if water were made up of separate particles, or droplets, one millionth of an inch in diameter, and thus had the structure of a mass of very fine shot, no microscope that has yet been constructed would enable us to see even a trace of that structure. We could not obtain any direct evidence of it.

47. Suppositions or Hypotheses; their Uses and their Value. When our means of observation of any natural fact fail to carry us beyond a certain point, it is perfectly legitimate, and often extremely useful, to make a supposition as to what we should see, if we could carry direct observation a step further. A supposition of this kind is what is called a *hypothesis*, and the value of any hypothesis depends upon the extent to which reasoning upon the assumption that it is true, enables us to explain or account for the phenomena with which it is concerned.

Thus, if a person is standing close behind you, and you suddenly feel a blow on your back, you have no direct evidence of the cause of the blow; and if you two were alone, you could not possibly obtain any; but you immediately suppose that this person has struck you. Now that is a hypothesis, and it is a legitimate hypothesis, first, because it explains the fact; and secondly, because no other explanation is probable; probable meaning in accordance with the ordinary course of nature. If your companion declared that you fancied you felt a blow, or that some invisible spirit struck you, you would probably decline to accept his explanation of the fact. You would say that both the hypotheses by which he professed to explain the phenomenon were extremely improbable; or in other words, that in the ordinary course of nature fancies of this kind do not occur, nor spirits strike blows. In fact, his hypotheses would be illegitimate, and yours would be legitimate; and, in all probability, you would act upon your own. In daily life, nine-tenths of our actions are based upon suppositions or hypotheses, and our success or failure in practical affairs depends upon the legitimacy of these hypotheses. You believe a man on the hypothesis that he is always truthful; you give him pecuniary credit on the hypothesis that he is solvent.

Thus, everybody invents, and, indeed, is compelled to invent, hypotheses in order to account for phenomena of the cause of which he has no direct evidence; and they are just as legitimate and necessary in science as in common life. Only the scientific reasoner must be careful to remember that which is sometimes forgotten in daily life, that a hypothesis must be regarded as a means and not as an end; that we may cherish it so long as it helps us to explain the order of nature; but that we are bound to throw it away without hesitation as soon as it is shown to be inconsistent with any part of that order.

48. The Hypothesis that Water is composed of Separate Particles (Molecules). It has been pointed out that we cannot see, and indeed that there is not much hope of our ever being able to see, the separate particles of water, even if water is composed of such particles. But it is perfectly legitimate to suppose that water is made up of such particles, if that hypothesis will enable us to explain the properties of water.

Let us suppose then that any portion of fluid water is really composed of a prodigious number of particles less (and probably much less) than a millionth of an inch in diameter. We may call these particles *molecules*.*

We are justified, in accordance with the general properties of matter (§ 18), in supposing that these molecules tend to approach one another. But the fact that water is slightly compressible justifies the supposition that its molecules are not in actual contact, but that they are separated by interspaces, just as the motes in the air of a dusty room are so separated.

What is it that keeps the molecules apart? We have seen that great mechanical pressure brings them but slightly nearer to one another; hence there is an equivalent resistance of some kind which keeps them apart. This resistance must have the same origin as the sensation which we know as heat, for it has been seen that diminution of heat diminishes the bulk of water; that is, allows the molecules to come closer together; that is, diminishes their tendency to keep asunder. Increase of heat, on the other hand, increases the volume of water; that is to say, drives the molecules further apart, or increases their tendency to keep asunder.

Suppose we call the cause of the tendency of the molecules of water to come together an *attractive force;* and the cause of their keeping apart, which manifests itself to us as the sensation of heat, and is, as we have seen, in all probability, a rapid vibratory or whirling motion of the molecules, a *repulsive force;* then, in the liquid state, these forces are so adjusted that the molecules are quite free to move, and yet hold together.

By adding heat the repulsive force is increased, until the molecules are about twelve times as far apart as they were in each direction; while the attractive force is overcome, and the molecules fly off in all directions as soon as they are unconfined. On the other hand, by taking heat away, the repulsive force is diminished, until the molecules become inseparable and the water assumes the solid form.

It is probable that the expansion of fluid water, at a temperature below 39°, depends upon the molecules taking up a peculiar arrangement as they approach one another. If sixteen men are formed into a column, four deep, and each man a foot from the other, the same men may stand closer together and yet form a hollow square, which occupies a larger space. That the molecules of water do take up a particular order in assuming the solid condition, is shown by the crystalline form of ice. Each crystal of hoar-frost owes its shape to the arrangement of its molecules, according to a definite geometrical pattern.

Thus the hypothesis that water is composed of separate molecules, is useful, for it helps us to some extent to explain the properties of water. And, when you study physics and learn the laws of motion, you will find that there is no end to the number of the truths established by observation and

* Diminutive of *moles*, a mass.

experiment, which can be explained by this hypothesis. Hence it may fairly be adopted and employed as a means of picturing to ourselves the order of nature, so long as no facts are discovered which are inconsistent with it.

49. All Matter is probably made up either of Molecules or of Atoms. The same reasons which lead to the adoption of the hypothesis that water is composed of separate particles justify its extension to all forms of matter whatever.

The metal **mercury** or **quicksilver**, for instance, may be supposed to be made up of distinct particles of mercury of extreme minuteness, and according to the temperature, these associate themselves in the solid (frozen mercury), liquid (ordinary quicksilver), or gaseous form (vapour of mercury). To whatever treatment pure mercury may be subjected, we cannot get anything but mercury out of it. The particles of mercury have never been broken up. Hence they are generally termed *atoms*, or particles that cannot be divided; and mercury is said to be an *element*, or a substance which is not compounded of any other substances.

Here is a case in which it is very useful to distinguish between fact and hypothesis. The matter of fact is that, up to the present time, no one has been able to get out of pure mercury anything but pure mercury. The statement that mercury is a simple substance, and therefore never can be broken up into any other substances, is a hypothesis which future observation and experiment may or may not confirm.

A hundred and fifty years ago it was universally believed that water was as much an element as mercury. But water is now well known to be a compound. In fact, as has already been said, the particles of water may be very readily broken up or *decomposed* (in what way, you will learn when you study chemistry) into two totally distinct substances, *oxygen* and *hydrogen*, which are gaseous at all known temperatures, though by combining vast pressure with extreme cold they have recently been liquified. Each of these gases, according to our hypothesis, consists of particles, and since these can by no known means be further broken up, they are considered to be *atoms* like those of mercury.

Nine parts by weight of pure water always yield eight of oxygen and one of hydrogen. The hypothetical particle, or molecule of water, therefore, must be composed of atoms of oxygen and hydrogen having this relative weight; and chemists have grounds for believing that one atom of oxygen and two atoms of hydrogen exist in each molecule of water. If this be so, the structure of water must be more complicated than we thought at first; and each particle of water (the molecule) must be a system composed of three separate atoms.

50. Elementary Bodies are neither destroyed nor is their Quantity increased in Nature. It has been seen that when a cubic inch of water is dissipated by heat, it is not destroyed, but that it merely changes its form from the fluid to the gaseous state, while its weight remains unaltered. If the same cubic inch of water is decomposed into oxygen and hydrogen gases, the water is indeed destroyed, but the matter of which it consisted remains unchanged in weight. If the water weighed 252·5 grains, the oxygen gas will weigh 224·45 grains, and the hydrogen gas will weigh 28·05 grains. And nothing that man has been able to do has affected the weight of a given quantity of either of these gases. So far as we know, elementary bodies retain their weight under all circumstances, and can be traced by it whatever shape they may take. If this is true it follows that, in the order of nature, matter is *indestructible:* the quantity of it neither increases nor diminishes.

Hence it follows that natural things and artificial things resemble one another in one respect. It is true of both that the matter of which they are composed is never destroyed and never increased; and therefore the order of events in nature as much consists in the joining together and putting apart of natural bodies by natural agencies, as the order of events in the artificial world consists in the joining together and putting apart of natural bodies by human agencies.

51. Simple Mixture. In order to learn the manner in which water may be broken up into its elements or decomposed, you must turn to the Primer on Chemistry. But as a preliminary to the study of that science, it may be useful to consider some simple cases of composition and decomposition which are exemplified by water.

If half a pint of water, coloured by putting a little ink into it, is added to the same quantity of clean water, the two will readily mingle; the total quantity of water will be a pint; and its color will be just half as dark as that of the colored half-pint. This is a case of simple *mixture*. The volume of the mixture equals the sum of the volumes of the things mixed, and there is no change in the properties of these things. So when water evaporates, the gaseous water or vapor mixes with the air in the same way, the molecules of the one body dispersing themselves between the molecules of the other until there is the same proportion of each everywhere. In like manner, sand and sugar may be (and unfortunately often are) mixed, without any change in the properties of either, or in the space which they primitively occupied.

On the other hand, oil and water will not mix however much you may stir the two together; and the oil, being the lighter, rises to the top as soon as the fluid is quiet. Nor will quicksilver and water mix, but the quicksilver, being very much heavier than the water, rushes to the bottom of the vessel into which the two are put. Neither will sand nor iron filings mix with water; as heavier bodies, they also sink to the bottom. Nor does powdered ice, though it is water in another shape, mix with ice cold water; as a lighter body, it floats at the top.

52. Mixture followed by Increase of Density; Alcohol and Water. Strong spirit, or *alcohol*, is a clear, transparent fluid which looks like water, but is a very different substance. For example, it boils at a much lower temperature, it burns with a blue flame, it has intoxicating properties, and, like oil, it is very much lighter than water. Hence if colored spirit is poured gently upon the surface of water the spirit rests upon the water. Suppose, now, that we take a tall measure graduated into ten equal parts. Fill the lower five with water, and then, very gently, pour in the strongest alcohol, colored in some way, until the tenth mark is reached. We shall have five volumes of water below, and an equal quantity, or five volumes, of colored alcohol above. Where the two are in contact, the color will be diffused into the water for a short distance, but not far, showing that only a slight mixture is taking place. This, however, is not because the two fluids mingle with difficulty; for, with slight stirring, they mix completely, and you have a fluid the color of which is about half as intense as that of the alcohol, and many of the other properties of which are intermediate between those of pure alcohol and those of pure water.

Thus far, nothing further than simple mixture, as when colored water was added to pure water, seems to have occurred; but, in reality, something more has happened. In the first place, the mixture is a good deal warmer than either of its components; that is to say, *heat* has been *generated*. In the second place, if you measure the volume of the whole fluid after it has cooled, it no longer stands at the mark *ten* but distinctly lower, or about *nine and three-quarters*. As the volume of the mixture is less than the sum of the volumes of its two components, it follows that the *density* of the mixture must be *greater* than a density midway between that of the water and that of the alcohol. In other words, the

molecules in the mixture do not occupy the same space as they did when they were separate. The result is the same as if the ten volumes had been compressed until they occupied only nine and three-quarters; so that the effect is a contraction similar to that which would be brought about by taking away heat from the mixture. In fact, as we have seen, the mixture gives out a quantity of heat.

There is another respect in which the mixture is unlike both its constituents. It both *boils* and *freezes* at a much *lower* temperature than *water* does, and at a *higher* temperature than *alcohol* does. In fact pure alcohol has not yet been frozen. If the molecules of the alcohol were merely diffused among those of the water as water is diffused through wet sand, they ought to pass into the gaseous state at the same temperature as that at which alcohol boils; and it would then be very easy to separate alcohol from water by distillation. But the fact is not so; alcohol cannot be obtained free from water by distillation unless something which holds water very strongly, such as quicklime, is added, so as to keep all the water back when the fluid is heated.

Thus alcohol and water, mingled together, give rise to a fluid which is not a mere mixture, the properties of which are known if we know the properties of its components; it is, in strictness, a new body, in which the molecules of the water and those of the alcohol affect one another to a certain extent, and modify the pre-existing properties of each.

This effect of different bodies upon one another becomes much more manifest when water is brought into contact with certain solids.

53. Solution: Water Dissolves Salt. If a spoonful of salt is put into a tumbler of cold water and the water is stirred, the salt swiftly vanishes from view; and, after a time, so far as our sense of vision goes, the water appears to be just what it was before. But if the water in the tumbler at first weighed five ounces and the salt weighed two ounces, the water in the tumbler will now weigh seven ounces; the water will now taste salt, the salt is said to be *dissolved*, and the *solution* is called *brine*. Moreover, the solution is said to be *saturated*, for if you put more salt in it will remain unchanged. Water, in fact, will dissolve two-fifths of its weight of salt, and no more. If the brine thus formed is put into a wide dish, so that the water may evaporate; or if it is heated and the water boiled away; as fast as the water diminishes, a quantity of salt, equal to two-fifths of the water which is converted into steam, returns to the solid state and falls to the bottom of the vessel. And when all the water is driven off, the salt which remains will have exactly the weight, and all the other properties which it had before it was dissolved by the water.

Thus, contact with water has had a very singular effect upon the salt. It appears to have changed one of the properties of the salt, namely, its *solidity*, but to have left all the rest unaltered. We saw just now that powdered ice does not mix with ice-cold water, but that the fragments of ice remain solid. The moment, however, that the temperature rises, the *cohesion*, or sticking together of the molecules, which is the characteristic of the solid state, comes to an end; they become loose and free to move, and they mingle with the surrounding water. Or we may say that the ties which held the molecules of the solid together are dissolved, so that the solid water becomes fluid.

The resemblance of this process to the dissolving of salt in water is so obvious that, in common language, it is often said that a lump of salt or of sugar *melts* away in water; but if you try to make salt fluid by heat, you will have to expose it to a very high temperature, so that the conversion of salt from the solid state into the liquid state by solution in cold water is obviously a very different process from liquefaction by heat. Nevertheless the result is the same so far as the condition of the salt is concerned. The cohesion between its molecules is destroyed, and they distribute themselves evenly among the molecules of the water, just as the molecules of steam distribute themselves among the molecules of air. And, when you study chemistry, you will learn how it may be proved that the smallest drop of the solution of salt contains exactly the same proportion of salt as the whole does.

If brine is allowed to evaporate slowly, the molecules of the salt arrange themselves, as the water leaves them, in beautifully regular cubical crystals. You may see them form easily enough if you watch a drop of brine gradually dry up under a microscope. The salt crystals contain nothing but salt. If they are heated till they become red-hot they pass into the fluid state; and when still further heated, the fluid salt becomes a vapor or gas, and, as such, flies off into the air, or *volatilizes*.

Thus we see that when salt and water are brought into contact, the salt undergoes a certain amount of change, while the water does not remain wholly unchanged. For brine no longer boils at 212° but requires a considerably higher temperature. The salt, as it were, holds the water back and prevents it from assuming the gaseous state under the same conditions as if it were pure, just as, in the previous case, the water held the alcohol back; or we may say that the force of heat which drives the molecules of liquid water apart, when steam is formed, has a greater resistance to overcome when salt is dissolved in the water. And just as the presence of alcohol lowers the freezing point of the water with which it is mixed, so does the presence of salt lower the freezing point of water. Sea water, which is a weak brine, begins to freeze at about 27°; and the ice which is formed is quite pure, while the remainder of the sea water becomes richer in salt.

If we mean by attraction that which opposes any force which tends to separate bodies, then we may say that the molecules of salt and those of water attract one another. And such attraction between molecules of matter of different kinds is called *chemical attraction*.

54 Quicklime and Water: Plaster of Paris and Water: Combination. Quicklime is a substance obtained by heating chalk or limestone to redness. When pure, it is a white, hard solid, which can be made to pass into the liquid and gaseous states only at enormously high temperatures. If a lump of fresh quicklime is placed in a saucer and about one-third of its weight of water poured upon it, there will be a great turmoil, heat will be evolved, the water will disappear, and the lime will crumble down into a soft white powder. This operation is what bricklayers call *slaking* lime. And if no more water has been added than the proportion mentioned, the pure white powder which results will be solid and dry, the water having to all appearance, vanished.

In the solution of salt we saw a solid become fluid under the influence of water; in the slaking of lime the fluid water enters into the structure of a solid. If more water is added, this solid dissolves or becomes liquid, as the salt did, and the solution is called *lime-water*. By carefully-managed evaporation of the water the lime may be recovered in the form of crystals, just as the salt was recovered. But there is this difference, that the salt crystals contain no water, while the lime crystals not only contain water, but contain exactly the same proportion as exists in slaked lime, that is to say, 18 parts water to 56 parts lime.

The water thus bound up with the lime into a new solid holds on so firmly to the lime that it requires a red heat to separate the two. The lime and the water are said to be *chemically combined;* and as the proportion of lime and water in slaked lime, or lime crystals, is always the same, they are said to be confined in *definite proportions;* and the slaked lime receives the special name of *hydrate of lime*.

Gypsum or **Plaster of Paris** is a dry, white powder. If mixed with a little water it does not slake after the fashion of quick lime, but the mixture soon *sets* or becomes hard; and, at the same time, the greater part of the water disappears. In fact, it has combined with the plaster of Paris and forms part of another hydrate, in which, when the superfluous moisture dries, not a trace of water is to be seen. It is this property which is taken advantage of when plaster of Paris is used for making casts and moulds. The fluid plaster is poured over and round the body to be cast; as a fluid, it applies itself conveniently to all the inequalities of its surface; and, when it sets, it retains the shape which it has thus acquired. Set plaster of Paris may be perfectly dry; but it nevertheless contains between one-seventh and one-eighth of its weight of water, fixed and forming an integral part of the solid hydrate. And if the set plaster is strongly heated, the combined water is driven off and it returns to its original state.

Gypsum is found abundantly in nature, in the shape of beautiful transparent crystals which are called *selenite*. These crystals have the same composition as set plaster, that is to say, they are hydrates. A thin flake of such a crystal viewed with the highest powers of the microscope appears perfectly homogeneous. Nevertheless, there is good reason for the conclusion that it consists of molecules of water and molecules of gypsum which hold together so strongly that they form a hard, brittle, glassy solid. Moreover, the molecules of the hydrate itself hold together more strongly in some directions than in others. It is very easy to split the crystals lengthwise; while much more force is needed to cut them crosswise, and then they do not split, but break.

Glauber's salt and Epsom salts are other examples of solids which dissolve in water and separate in the crystalline form as the water evaporates; and which, like lime and gypsum, combine with a definite proportion of water to form crystalline compounds. In fact, each of these glassy, brittle solids contains more than half its weight of water.

Thus we see that two bodies, of which water is one, may combine together to give rise to something different from either. And we are thus led to the science of *chemistry*, which tells us exactly how bodies combine, what comes of their combination, and how compounds may be separated into their constituents.

55. Mineral bodies may take on definite shapes and grow, or increase in size, by the addition of like parts Water and all the other natural bodies which have hitherto been mentioned, are what are called *mineral bodies*, although, in common use, the term mineral is usually restricted to ores and metals. Now, we have repeatedly had occasion to remark that, under certain circumstances, not only water, but many other mineral bodies, assume regular shapes. The most familiar example is that of the beautiful imitation of leaves and foliage which is presented by the ice which forms on a window in winter. But we have also seen that common salt, lime, gypsum, Glauber's salt and Epsom salts, also assume the crystalline form as they, or their compounds with water, are deposited from their solutions. And if a drop of solution of Glauber's salt or of saltpetre, is allowed to evaporate under the microscope, a wonderful spectacle will be presented. As the salt assumes the solid state, the crystals suddenly appear in the field of view as needles and plates disposed in beautiful patterns, which rival those of hoar frost, though they are quite different from them. In fact, as you will learn if you study *crystallography*, every crystallizable substance has its proper crystalline forms and never departs from certain strictly related geometrical figures.

A crystal of any of these substances will *grow* if placed under proper conditions. Thus, if a crystal of common salt is hung by a thread in a saturated solution of salt, which is exposed to the air, so as to allow the water to evaporate slowly, the molecules of the salt which is left behind and can no longer be held in solution, deposit themselves on the crystal in regular order and increase its size without changing its form. And, in this way, the small crystal may *grow* to a great size. The large crystals of sugar candy, which consist of sugar and water deposited from a strong syrup or saturated solution of sugar, grow in the same fashion, upon threads suspended in the evaporating syrup. In this mode of growth you will observe that the enlargement is effected by addition to the outside of the growing body; and moreover the matter which is added, namely, the salt or the sugar, already exists as salt in the brine or as sugar in the syrup.

B. Living Bodies.

56. The Wheat Plant and the substances of which it is composed. Every one has seen a cornfield. If you pluck up one of the innumerable *wheat plants* which are fixed in the soil of the field, about harvest time, you will find that it consists of a stem which ends in a *root* at one end and an *ear* at the other, and that blades or *leaves* are attached to the sides of the stem. The ear contains a multitude of oval grains which are the *seeds* of the wheat plant. You know that when these seeds are cleared from the *husk* or *bran* in which they are enveloped, they are ground into fine powder in mills, and that this powder is the *flour* of which bread is made. If a handful of flour mixed with a little cold water is tied up in a coarse cloth bag, and the bag is then put into a large vessel of water and well kneaded with the hands, it will become pasty, while the water will become white. If this water is poured away into another vessel, and the kneading process continued with some fresh water, the same thing will happen. But if the operation is repeated the paste will become more and more sticky, while the water will be rendered less and less white, and at last will remain colorless. The sticky substance which is thus obtained by itself is called *gluten;* in commerce it is the substance known as *macaroni*.

If the water in which the flour has thus been washed is allowed to stand for a few hours, a white sediment will be found at the bottom of the vessel, while the fluid above will be clear and may be poured off. This white sediment consists of minute grains of *starch*, each of which, examined with the microscope, will be found to have a concentrically laminated structure. If the fluid from which the starch was deposited is now boiled it will become turbid, just as white of egg diluted with water does when it is boiled, and eventually a whitish lumpy substance will collect at the bottom of the vessel. This substance is called *vegetable albumin*.

Besides the albumin, the gluten, and the starch, other substances about which this rough method of analysis gives us no information, are contained in the wheat grain. For example, there is woody matter or *cellulose*, and a certain quantity of *sugar* and fat. It would be possible to obtain a substance similar to albumin, starch, saccharine and fatty matters, and cellulose, by treating the stem, leaves, and root in a similar fashion, but the cellulose would be in a far larger proportion. *Straw*, in fact, which consists of the dry stem and leaves of the wheat plant, is almost wholly made up of cellulose. Besides this, however, it contains a certain proportion of mineral bodies, among them, pure flint or *silica;* and, if you should ever see a wheat-rick burnt, you will find more or less of this silica, in a glassy condition, in the embers. In the living plant, all these bodies are combined with a large proportion of water, or are dissolved, or suspended in that fluid. The relative quantity of water is much greater in the stem and leaves than in the seed.

57. The Common Fowl and the Substances of which it is Composed. Everybody has seen a common fowl. It is an active creature which runs about and sometimes flies.

It has a body covered with feathers, provided with two wings and two legs, and ending at one end in a neck terminated by a head with a beak, between the two parts of which the mouth is placed. The hen lays *eggs*, each of which is enclosed in a hard shell. If you break an egg the contents flow out and are seen to consist of the colorless glairy "white" and the yellow "yolk." If the white is collected by itself in water and then heated it becomes turbid, forming a white solid, very similar to the vegetable albumin, which is called *animal albumin*.

If the yolk is beaten up with water, no starch nor cellulose is obtained from it, but there will be plenty of fatty and some saccharine matter, besides substances more or less similar to albumin and gluten.

The feathers of the fowl are chiefly composed of horn; if they are stripped off and the body is boiled for a long time, the water will be found to contain a quantity of *gelatin*, which sets into a jelly as it cools; and the body will fall to pieces, the bones and the flesh separating from one another. The bones consist almost entirely of a substance which yields gelatin when it is boiled in water, impregnated with a large quantity of salts of lime, just as the wood of the wheat stem is impregnated with silica. The flesh, on the other hand, will contain albumin, and some other substances which are very similar to albumin, termed *fibrin* and *syntonin*.

In the living bird, all these bodies are united with a great quantity of water, or dissolved, or suspended in water; and it must be remembered that there are sundry other constituents of the fowl's body and of the egg, which are left unmentioned, as of no present importance.

58. Certain Constituents of the Body are very similar in the Wheat Plant and in the Fowl. The wheat plant contains neither horn, nor gelatin, and the fowl contains neither starch, nor cellulose; but the albumin of the plant is very similar to that of the animal, and the fibrin and syntonin of the animal are bodies closely allied to both albumin and gluten.

That there is a close likeness between all these bodies is obvious from the fact that when any of them is strongly heated, or allowed to putrefy, it gives off the same sort of disagreeable smell; and careful chemical analysis has shown that they are, in fact, all composed of the elements *Carbon*, *Hydrogen*, *Oxygen*, *and Nitrogen*, combined in very nearly the same proportions. Indeed, *charcoal*, which is impure carbon, might be obtained by strongly heating either a handful of corn, or a piece of fowl's flesh, in a vessel from which the air is excluded so as to keep the corn or the flesh from burning. And if the vessel were a still, so that the products of this *destructive distillation*, as it is called, could be condensed and collected, we should find water and ammonia, in some shape or other, in the receiver. Now ammonia is a compound of the elementary bodies, nitrogen and hydrogen; therefore (§ 50) both nitrogen and hydrogen must have been contained in the bodies from which it is derived.

It is certain, then, that very similar nitrogenous compounds form a large part of the bodies of both the wheat plant and the fowl, and these bodies are called *proteids*.

59. Proteid Substances are met with in Nature only in Animals and Plants; and Animals and Plants always contain Proteids. It is a very remarkable fact that not only are such substances as albumin, gluten, fibrin and syntonin, known exclusively as products of animal and vegetable bodies; but that every animal and every plant, at all periods of its existence, contains one or other of them, though, in other respects, the composition of living bodies may vary indefinitely. Thus, some plants contain neither starch nor cellulose, while these substances are found in some animals; while many animals contain no horny matter and no gelatin-yielding substance. So that the matter which appears to be the *essential* foundation of both the animal and the plant is the *proteid* united with *water;* though it is probable that, in all animals and plants, these are associated with more or less *fatty* and *amyloid* (or starchy and saccharine) substances, and with very small quantities of certain mineral bodies, of which the most important appear to be *phosphorus, iron, lime, and potash.*

Thus there is a substance composed of water, proteids, fat, amyloids, and mineral matters which is found in all animals and plants; and, when these are alive, this substance is termed *protoplasm*.

60. What is meant by the word Living? The wheat plant in the field is said to be a *living* thing; the fowl running about the farmyard is also said to be a *living* thing. If the plant is plucked up, and if the fowl is knocked on the head, they soon die and become *dead* things. Both the fowl and the wheat plant, as we have seen, are composed of the same elements as those which enter into the composition of mineral matter, though united into compounds which do not exist in the mineral world. Why then do we distinguish this matter when it takes the shape of a wheat plant, or a fowl, as *living matter?*

61. The Living Plant increases in Size, by adding to the Substances which compose its Body, like Substances; these, however, are not derived from without, but are manufactured within the Body of the Plant from simpler Materials. In the spring, a wheat-field is covered with small green plants. These grow taller and taller until they attain many times the size which they had when they first appeared; and they produce the heads of flowers which eventually change into ears of corn.

In so far as this is a process of growth, accompanied by the assumption of a definite form, it might be compared with the growth of a crystal of salt in brine: but, on closer examination, it turns out to be something very different. For the crystal of salt grows by taking to itself the salt contained in the brine, which is added to its exterior; whereas the plant grows by addition to its interior: and there is not a trace of the characteristic compounds of the plant's body, albumin, gluten, starch or cellulose, or fat, in the soil, or in the water, or in the air.

Yet the plant creates nothing (§50), and, therefore, the matter of the proteids and amyloids and the fats which it contains must be supplied to it, and simply manufactured, or combined in new fashions, in the body of the plant.

It is easy to see, in a general way, what the raw materials are which the plant works up, for the plant gets nothing but the materials supplied to it by the atmosphere and by the soil. The atmosphere contains oxygen and nitrogen, a little carbonic acid gas, a minute quantity of ammoniacal salts, and a variable proportion of water. The soil contains clay and sand (silica), lime, iron, potash, phosphorus, sulphur, ammoniacal salts, and other matters which are of no importance. Thus, between them, the soil and the atmosphere contain all the elementary bodies which we find in the plant: but the plant has to separate them and join them together afresh.

Moreover, the new matter, by the addition of which the plant grows, is not applied to its outer surface, but is manufactured in its interior; and the new molecules are diffused among the old ones.

62. The Living Plant, after it has grown up, detaches part of its Substance, which has the Power of developing into a similar Plant, as a Seed. The grain of wheat is a part of the flower of the wheat plant, which, when it becomes ripe, is easily separated. It contains a minute and rudimentary plant; and, when it is sown, this gradually grows, or becomes *developed* into the perfect plant, with its stem, roots, leaves and flowers, which again give rise to sim-

ilar seeds. No mineral body runs through a regular series of changes of form and size and then gives off parts of its substance which take the same course. Mineral bodies present no such *development* and give off no seeds or *germs*. They do not reproduce their kind.

63. The Living Animal increases in Size by adding to the Substances which compose its Body, like Substances; these, however, are chiefly derived directly from other Animals or from Plants. The fowl in the farmyard is incessantly pecking about and swallowing now a grain of corn, and now a fly or a worm. In fact, it is feeding, and, as everyone knows, would soon die if not supplied with food. It is also a matter of every-day knowledge that it would not be of much use to give a fowl the soil of a cornfield, with plenty of air and water, to eat.

In this respect, the fowl is like all other animals; it cannot manufacture the proteid materials of its body, but it has to take them ready made, or in a condition which requires but very slight modification, by devouring the bodies either of other animals or of plants. The animal or vegetable substances devoured are taken into the animal's stomach; they are there digested or dissolved; and thus they are fitted to be distributed to all parts of the fowl's own body, and applied to its maintenance and growth.

64. The Living Animal, after it has grown up, detaches part of its Substance, which has the Power of growing into a similar Animal, as an Egg. The fowl's egg is formed in the body of the hen, and is, in fact, part of her body inclosed in a shell and detached. It contains a minute rudiment of a fowl; and when it is kept at a proper temperature by the hen's sitting upon it, or otherwise, for three weeks, this rudiment grows, or develops, at the expense of the materials contained in the yolk and the white, into a small bird, the chick, which is then hatched and grows into a fowl. The animal, therefore, is produced by the development of a germ in the same way as the plant; and, in this respect, all plants and all animals agree with one another and differ from all mineral matter.

65. Living Bodies differ from Mineral Bodies in their Essential Composition, in the manner of their Growth, and in the fact that they are reproduced by Germs. Thus there is a very broad distinction between mineral matter and living matter. The elements of living matter are identical with those of mineral bodies; and the fundamental laws of matter and motion apply as much to living matter as to mineral matter; but every living body is, as it were, a complicated piece of mechanism which "goes," or lives, only under certain conditions. The germ contained in the fowl's egg requires nothing but a supply of warmth, within certain narrow limits of temperature, to build the molecules of the egg into the body of the chick. And the process of development of the egg, like that of the seed, is neither more nor less mysterious than that, in virtue of which, the molecules of water, when it is cooled down to the freezing-point, build themselves up into regular crystals.

The further study of living bodies leads to the province of *Biology*, of which there are two great divisions—*Botany*, which deals with plants, and *Zoology*, which treats of animals.

Each of these divisions has its subdivisions—such as *Morphology*, which treats of the form, structure, and development of living beings, and *Physiology*, which explains their actions or functions, besides others.

III. Immaterial Objects.

66. Mental Phenomena. Material objects are all either not living, that is to say, mineral bodies, or they are living bodies. Everything which occupies space, offers resistance, has weight, and transfers motion, belongs to one or other of these two great provinces of nature. The sciences of Astronomy, Mineralogy, Physics, and Chemistry deal with the former, while Biology, with its two divisions of Zoology and Botany, treats of the latter. But natural knowledge is not exhausted by this catalogue of its topics. In the very first paragraph of this Primer, in fact, we had occasion to draw a distinction between *Things*, or material objects, and *Sensations;* and a moment's reflection is sufficient to convince you that sensations are not material objects. A smell takes up no space and has no weight; and to speak of a pound or of a cubic foot of sound, or of brightness, is, on the face of the matter, an absurdity. Pleasure is said metaphorically to be fugitive, but you cannot imagine a pleasure as a thing in motion.

What we call our *Emotions* are in like manner devoid of all the characters of material bodies. Love and hatred, for example, cannot for a moment be conceived to have shape, or weight, or momentum. And when, in reasoning, we think, our *Thoughts* have the same lack of the qualities of material things.

Sensations, emotions, and thoughts, thus constitute a peculiar group of natural phenomena, which are termed *mental.*

67. The order of Mental Phenomena: Psychology. A definite order obtains among mental phenomena, just as among material phenomena; and there is no more chance, nor any accident, nor uncaused event, in the one series than there is in the other. Moreover, there is a connection of cause and effect between certain material phenomena and certain mental phenomena. Thus, for example, certain sensations are always produced by the influence of particular material bodies on our organs of sense. The prick of a pin gives pain, feathers feel soft, chalk looks white, and so on. The study of mental phenomena, of the order in which they succeed one another, and of the relations of cause and effect which obtain between them and material phenomena, is the province of the science of *Psychology.*

All the phenomena of nature are either material or immaterial, physical or mental; and there is no science, except such as consists in the knowledge of one or other of these groups of natural objects, and of the relations which obtain between them.

[THE END.]

End of Required Reading for June.

THE SOWER.

A PAINTING BY JEAN FRANCOIS MILLET.*

In the dim dawning sow thy seed,
And in the evening stay not thy hand.
What it will bring forth—wheat or weed—
Who can know, or who understand?
Few will heed.
Yet sow thy seed.

See, the red sunrise before the glows,
Though close behind thee night lingers still.
Flapping their fatal wings, come the black foes,
Following, following over the hill.
No repose!
Sow thou thy seed.

We, too, went sowing in glad sunrise;
Now it is twilight, sad shadows fall.
Where is the harvest? Why lift we our eyes?
What could we see here? But God seeth all.
Fast life flies.
Sow the good seed.

Though we may cast it with trembling hand,
Spirit half-broken, heart sick and faint,
His winds will scatter it over the land;
His rain will nourish and cleanse it from taint.
Sinner or saint,
Sow the good seed.

*This French artist, lately dead, was only discovered to be a great artist after his death. "The Sower" is one of his numerous studies of peasant life—intensely realistic, yet with a soul beneath the realism. The steadfast labourer with his seed-bag—dim light in front and darkness behind, in the which follow a cloud of black crows—is a picture never to be forgotten.

MEXICO.*

Our civil war was the great reason why the circumstance on which I am to address you this afternoon did not claim at the time the attention from the people of this country that it otherwise would have received. I assume that you all have more or less fragmentary knowledge of the fact; and the advantage which my lecture will claim will be, to round off your information on the subject, and to present it to you as a whole. I will venture to characterize what I shall say as exhibiting one of the most remarkable interventions of Almighty God in human affairs, with special reference to liberty and the diffusion of evangelical religion. In 1853 the influence and power of the despotism of the Catholic Church might be regarded as embodied in General Santa Anna, a man who held in himself more history than any other man in Mexico. When I used to read of his influence and power and despotism, I little thought it would fall to my lot to visit him in the last few days of his life, occupying a position in a rented house, in a back street in Mexico, and dependent for his daily bread upon the liberality of his friends. But such are the changes that have occurred, and they indicate the amazing alterations which have ensued in America, as the result of the circumstances on which I am now to address you. Clive and Cortez, one in the east and the other in the west, founded empires for their respective countries. How different is India to-day under the control of a Protestant power from the condition of Mexico under the control for three hundred and fifty years of a Roman Catholic power. No man who knows Mexico can doubt, no man who has read Prescott's History can doubt that the Mexican people are to-day in a worse condition than when Cortez conquered Mexico. More ignorant, worse clad, more deeply degraded and more thoroughly destitute of all that constitutes the comforts of life. Take any of our evangelical churches, and let that church have held a land under its absolute control, for three hundred years, and leave it more degraded than it found it, what worth would we think there was in such a denomination, in such a religion? And yet, tested by this principle, to which all are amenable, the Catholic Church never developed more thoroughly than she has done in Mexico, the terrible failure that she exhibits as a power to civilize and redeem men.

My lecture is divided into eight parts. The method of Rome's reign over the Aztec nation for three centuries and a half. Second, the effects on the nation. Third, the struggles of the people for constitutional freedom. Fourth, Rome's cruel and desperate efforts at repression. Fifth, the ultimate victory of civil and religious freedom. Sixth, the vengeance of God upon the parties that were implicated in this conspiracy against the welfare of the race. Seventh, the resurrection of the nation; and lastly, the open door that God has set before evangelical Christians in Mexico, with special reference to my own denomination.

In the first place, we will consider the methods of Rome's reign in Mexico. As soon as the Aztec nation was conquered, Cortez introduced what was called the hacienda system. The estates of the country were divided among the *Conquestadoros* and their followers, and the Aztec people were placed in fortified farm-houses, and there they have remained, from that time to this, serving the baron on wages fixed by himself, required to purchase all their supplies at his store, he thus realizing a double profit upon their daily toil. A law was passed that made it unlawful for any of this class to remove from one hacienda to another if he owed the proprietor twenty dollars, without paying that and the interest; and, of course, as it was the master's interest to see that all persons in his employment should go in debt to him to that extent, they thus lived and died—vegetated and died, in their own locality, destitute of interest in their native soil.

At each of these haciendas Cortez built a church, established a curé, and after having completed this system of civilization, he introduced into the country the Franciscan friars to catholicize the nation, and associated with these were the friars of the Dominican order, clothing them with inquisitional powers, with the design to conform these people by force to the ideas of the Catholic Church, and thus complete the civilization which Spain introduced into Mexico. The church was richly endowed. This fact will come out with greater prominence as I proceed. The fact is that twenty years ago the Catholic Church in Mexico was the wealthiest ecclesiastical establishment on the face of the earth. President Juarez called upon his minister Lardo, for a report on the subject which has given the facts to the world, and from that report I quote, when I tell you that the nine bishops of Mexico held between themselves an annual income of seven hundred and twenty-five thousand dollars, of which the archbishop received for his share one hundred and thirty-five thousand dollars per year. Now, for a bachelor bishop, who had no family to support, and only himself to take care of, it seemed an amazing amount of money to pay for his services, but that was the scale on which things were done. Twenty-five millions was the income of the Catholic Church from her property and her tithes. She was the wealthiest church and Mexico the poorest nation on the face of the earth, according to the population a quarter of a century ago. All this was confirmed and established by what is called a concordat, which is a compact between the head of the Catholic Church and the state, in which an engagement is entered into by the government that all the legislation shall receive the sanction of the Pontiff; and such a compact or concordat held Mexico, confirming and maintaining that state of things to which I have referred. The church then was the banker of the nation. There was no other bank in Mexico. If a man wanted a loan of a few thousand dollars he went to the archbishop, gave his obligation, which they preferred to be in a bond or mortgage because they expected they could so manipulate circumstances that the property would fall into the hands of the church for masses for the repose of the donor; and the church was thus growing wealthy at the expense of the nation. The position taken by the Catholic Church was this: When the tax-gatherer came around to the religious corporation which held half of the real estate in the city of Mexico, and asked for the tax, they said, "Why, it is all consecrated. We will not pay a cent," and they turned him out, and there was no power in the city to enforce the collection. The result was that all the public burdens were thrown on the estates of the laity. Any of you taking that fact home to your own village, town, county or city, can imagine what state of things there would be if any church there held one-half of the real estate or the income, and the lay estate had to bear all the public burdens, notwithstanding the fact that you gave the church the advantage of police, and sewerage, and gas, and all the other conveniences of our modern civilization. This brought about such a condition of things, that the state had either to die or revolutionize. They could not live at this rate, and as they chose to have a national life for themselves, they chose revolution and carried it out. There were fifty convents at that time in the City of Mexico alone, and five thousand six hundred clergy in the country for nine millions of population.

Secondly, the effect upon the nation, as I have remarked, from my own observation for seven years in the country and from the constant reading of the authorities upon this question, nine-tenths of which are Roman Catholic. The confessor of Maximilian and the chaplain-in-chief of the force

* A lecture delivered at Chautauqua, August 2, 1880.

that France sent to establish him upon the throne in Mexico, and Madame Calderon, the wife of the Spanish ambassador, a lady of learning and ability, but a devout Roman Catholic—these are the two authorities upon which I may rely, not to mention others, for every statement I make to you.

The condition of the people. The abbot, a French priest, remember, says, that he found in Mexico the most degraded condition of human nature on which his eyes ever looked. He declares that the majority of priests of Mexico were either only fit for the gallows or the galleys. He goes on to illustrate this, that the majority of the nation, I mean the men and women living together as man and wife, were living outside the bonds of lawful wedlock. The fact is, that during the past seven years we have had the utmost solicitude to secure that men seeking membership in the churches should be free from this disability. In some cases I have had to deal with men seeking exhorter's license who, after careful inquiry, I found had not been married. When inquired of they said that before the passage of the civil law, the clergy charged seventeen dollars for giving the benediction of the church on the sacrament of matrimony. I would be told: "My wages were three rials a day," about thirty-three cents, "and it would have taken me twenty years of saving to have gathered together enough to secure the benediction of the Church of Rome upon my marriage. So we took our covenant, one with the other, and pledged our love and fealty, and we have lived so since." Now, realize the condition of society like that. The abbot tells us in his book here, that he was horrified to find two things. In the first place, he says that going through the country and getting information about it, he found his brethren very generally refused him the rights of hospitality, and when he came to inquire closely into this niggardliness of disposition, he found it arose from the fact that they did not wish him to see their social life, or to become acquainted with their wives and children, and he makes the dreadful statement, that when he came to the people to inquire in regard to this thing, he found them perfectly indifferent in reference to them, and some of them had the boldness to say to his face they were quite satisfied that a priest should be a married man, if he was only contented with one wife. Such a state of things exists in this unfortunate state of Mexico. What can you expect of people thus situated.

What was the state of the new government? Mr. Chairman, in that envelope which I hand you, there are fifty-seven photographs of the men who have held power in Mexico since 1851, since the land proclaimed her independence of Spain. In the thirty-nine years previous to the reign of Maximilian there have been fifty governments in Mexico—a pronunciamento, an altered government in every nine months, involving a sacrifice of life, the overthrow by force of the government power, and the institution of another, and that fact will show you how far from peace unfortunate Mexico has been for the last fifty years. The policy was this: Rome, having the money and knowing the price of the corrupt generals in the country, when any man in the presidential or dictatorial chair would dare to act contrary to her will, and consult the popular voice, and think to establish civil and religious liberty, at once thrust him down. Down went the government, and the one put up must satisfy the Church of Rome and only could stand as long as she was satisfied. If one could stop here in regard to the circumstances of this country, it would not be as bad as the state of things which I have now to tell you of. I have mentioned the Inquisition, that power of oppression that Romanism introduced into the country. My friends, it would have been a very awkward thing, during the last fifty years, especially, to have had an *auto-dä-fé* side by side with this United States of ours as they used to have in Spain. But Rome had another way of disposing of those who dissented from her views, and many of those men who looked for freedom, had to take this condition of things in their hands. When the Liberals became victorious, they rushed at the two sections of the Inquisition at the capital in Puebla, just as the mob of Paris did on the old Bastile, and they brought out the living and set them free. I have been told by men who were there in the crowd that the men who were brought out from these dungeons where they had been confined for years, went down the streets of Mexico to find out whether any of their friends were still living, and the tears were forced from the eyes of the people as they looked on. But what was worse, they were assured that in those eight feet walls, for they seemed to build for eternity, there would be found secrets of that prison-house that ought to be brought to light, and they tapped on the walls and wherever they found a hollow sound they dug in, and in the cells there they discovered the evidence of what Rome had done. Not like men prepared for the grave, but in their daily clothing, they stood. The victims of Roman tyranny were taken from the examining chapel and put into these cells and a little board put up before their faces and there they were left to die; some of these were women. If ever you go to the city of Mexico, there, opposite the museum and in the great hall on the right side you will find two persons embalmed by the government. They were recent enough for this use to be made of them, and there they stand in two glass cases; one of them is a woman, and her baby is at her feet. These fiends in human form dealt with the citizens of Mexico in this way; with the men who loved freedom and looked for light. The government brought a number of those persons out and put them on a stand and sent for the city photographer to take them, and I have one of the photographs in my hand, showing four of those persons. They were manacled by the hands and wrists, and in that condition, they sank down in those dark dens and died for freedom. Of course, such facts as these aroused the popular indignation against the ruling hierarchy, and they determined, at whatever cost, they would regain their freedom.

I now come, in the third place, to speak of the struggles for that freedom. A grand man, whose photograph I have with me to-day, Hidalgo, the Washington of Mexico, a curate of the Catholic Church, loving his native land better than he loved the ecclesiastical despotism of Rome, prepared his declaration of independence; and flew that flag from the balcony of his home in the town of Delores, on the second day of September, 1860, and pledged his life and sacred honor to maintain it. The Aztec people gathered around it and cheered it. An army formed. He was the centre, and he tried to fight it out with the hierarchy of Rome and to win freedom for his country, but he failed. The force brought by the church party defeated him. He was captured and condemned to die. The grand old man told them they might kill his body but could not kill his soul. They shaved his head and hands to take the consecration off from him, and stood him up to die like a felon. The last words the old man uttered were these: "Let Jesus live, and let Mexico live;" and he dropped dead, shot to the heart. Friends, when you are in Mexico on the 22d day of September, at eleven o'clock in the morning, for they keep the time, and in the great square, in that plaza, you will see from the national palace come forth the president of Mexico, and both houses of congress and the military, and the people, and the old flag of Hidalgo is brought forth and saluted with a royal twenty-one, and speeches are made, and their Fourth of July celebrates the fame of a man who died for his country, and, though he died, yet his cause lives, and is to-day triumphant in Mex-

ico. Now, what were these struggles for freedom. It was a dreadful struggle, for on one side there was power, money, foreign influence, appeals to conscience, and the Inquisition, to repress. And yet, notwithstanding this, these lovers of freedom, undrilled, hardly armed, fought it out to the last, and in 1867 completed the triumph of freedom.

Associated with this comes in the religious question. You know that Texas was formerly a part of Mexico. The same rule extended up to its northern boundary. The Lone Star State took a notion that it would like to have a separate existence and so cut herself off from Mexico, and a war ensued, but she maintained her right, and what would old Santa Anna say, the man who crossed its bound and fought to the bitter end, could he be told that seven Methodist conferences meet in that state to-day, and that it is becoming a power for the Protestant empire. But before we touch upon that we have other considerations to speak of. The war of 1846, partly growing out of the preceding facts, occurred. Taylor and Winfield Scott entered Mexico. The pious men in their armies applied before they left New York for Spanish Testaments and Bibles. The American Bible society were not ready for the demand, and the result was they had to send to London. They were sent forward, in many a knapsack, and in boxes in the commissariat wagons,the word of God came. Wherever the American army rested for the night, the people came to talk with the northern republicans, and they gave them copies of the scriptures. They told them that the word of God was the magna charta of human freedom, and that a Bible reader could never be a slave, and this led to the studying of the word of God in Mexico, as a book in favor of civil and religious freedom. That was the seed, the fruit of which we are reaping to-day. So, when God could find no other method, from the mouth of American cannon in the march of the American army, the good seed sprang forth. As soon as Scott and Taylor left the country, a raid was made on the Bible. Every effort was made by the Catholic priests to make the people give them up, and many did it, and in the plazas of Mexico, fires were made of them, and priests and fanatics danced around, delighted that they were destroyed. But many have never been given up.

Rome became aroused and desperate. Our near neighborhood began to be a terror to them. She intended to hold forever the seventeen states of Central and South America, so that republican institutions, the word of God, or evangelical religion should never cross their bounds and change the condition of the peoples. To the maintenance of that determination, the Church of Rome devoted all her energy, and the tremendous struggle of the past few years ensued as consequence. The intention of the Church of Rome was to erect on the Rio Grande a break-water beyond which our freedom and our faith should never pass to evangelize these states of Central and South America. A few months ago I stood in St. Paul's church in the city of Rome, and, Dr. Vernon translating for me, I gave the lecture I am giving you this afternoon, and when I was through a venerable gentleman stepped forward from the congregation and introduced himself. He said: "at the time of which you speak, the inception of the effort to send Maximilian to Mexico, I was a prelate of the Catholic Church." He is so no longer. He says: "I know that the statements that you have made concerning the effort to accomplish this French intervention are true, and I know it from my personal knowledge. I was not aware of the reasons of the emperor's execution, or the subsequent facts concerning the religious liberty that has grown out of them, and I thank you for rounding off my information, but I want you to have the satisfaction of knowing that in regard to the mysteries of that movement, you have the facts." Rome never had, and does not intend to have any regard for the people, or respect for their will, and hence, instead of conciliating the people, and agreeing on some basis of peace between church and state, the Roman hierarchy determined to carry it to the last and bitter end with a high and strong hand. So there was no hope for the Pope but to fight. They had to revolutionize or sink. What did they do under those circumstances? A conspiracy grew out of this matter, and as the nation repelled the church, and determined to be free, there came a resolution on the part of Rome to seek a foreign intervention. His emissaries went to Europe, and amongst despotic powers of that land they sought for aid, and that was the origin of the circumstances which brought Maximilian to Mexico. But there was one thing that caused these people anxiety. There stood in their path the Monroe policy, or the Monroe doctrine, and they did not wish to come in collision with it. Three years passed away without determining what should be done, and at last our war broke out. What is this doctrine? It is called after Monroe's name, but the Father of the Country laid it as an obligation on the consciences of the people to keep themselves free from European alliances, on this continent, and to work out their own destiny, free from foreign interposition. Jefferson several times called the attention of the French government through Monroe, who was then a minister to that country, to this great question, and when Monroe succeeded afterwards to the chief magistracy of the nation, he embodied this doctrine in a policy approved by the sentiments of his country, and as late as 1865 President Johnson re-affirmed it. The idea is that we have prospered and grown by minding our own business. We have never interfered with Europeans nor with European governments, much as we would desire to see liberal principles and forms of administration prevailing among them; and we have simply asked from Europe a reciprocity of non-intervention; so that the states may work out their own destiny free from foreign intervention, and that the United States might not see foreign powers establishing themselves on the soil of this hemisphere or interfering with a free government. Agents were sent by the church out of Mexico to work up, and make an arrangement for an intervention. If they could have done it possibly, and without awakening the sensibilities of this government, they would have done it. But, after feeling their way, and finding it impossible, they waited their hour. That hour came probably sooner than some of them expected. Juarez had just come to the front. He was elected chief justice of the United States of Mexico and drafted a splendid constitution of Mexico, as good as our own, and some have thought it better. In 1857 it was made the constitutional law of the country. They attempted to give it force. The church party fought it. It contemplated the disestablishment of the Catholic Church, the secularization of their property, except the church edifices which were to be given to her, and to throw her upon the voluntary system for her support. She fought it and continued to fight it until 1863, and right there, where it seemed a wonderful opportunity for these people who were seeking foreign interference, our war of the rebellion broke out, and they believed their hour had come. Napoleon III sent his armies and Maximilian followed. The republic was overthrown, and a monarchical system was established in Mexico. We could not hear the thunders of those guns on the other side of our own country on account of our own intervening conflict, and during those three years of dreadful agony, that cause over there was struggling between defeat and success. The constitutional president of the country, Juarez, was driven from his capital and obliged to go from state to state, pursued by French legions, until at last he stood on the very borders of the United States. He never passed the line, however, but

with his cabinet and a mere handful of troops, he maintained for three years and eighteen days the unequal conflict.

The church party thought they had accomplished their purpose. Maximilian was blessed and sent by the Pontiff, and in 1864 landed at Vera Cruz and was triumphantly received at the capital of the nation. He was lauded by the church and was expected to restore the old *regime* which had existed before the efforts made by the imperial party. But he had not been three months on the throne, before the Catholic Church found they had an elephant on their hands. Maximilian had brought with him European ideas of government. And when the Roman Catholic hierarchy of Mexico found that he was indisposed to reverse all the action of the republican governments that had preceded, and that he could not restore the Catholic Church to her former position of power and despotism over the nation, they began to inform him that he was not the person they expected, he was not the man for their money, and had not acted according to their expectations. He told them if he reigned over Mexico, it must be as a constitutional sovereign. So, after a great deal of chaffing, they concluded they had better put up with the man that they had, and look to the future with hope to do more than Maximilian was willing to do. In the meantime appeals were made by Juarez through his representative at Washington and it is wonderful to read how many of those appeals were made to the United States government to lift a finger to help the struggling cause of freedom in the adjoining republic, but Seward and Lincoln felt that they were so loaded down with obligations and surrounded by dangers, that although their sympathies were given to the outraged cause of liberty in Mexico, where a foreigner was sitting on a throne sustained by French bayonets, and against the will of the nation he attempted to rule, they nevertheless felt, that all they could do was to sympathize. They knew very well that the French government were only awaiting a pretext to recognize the Southern Confederacy, and that the English government was similarly disposed.

Let me ask your attention to two or three facts. The French emperor pressed the English government to recognize Jefferson Davis and the Confederacy. There was an unwillingness to do it. The Pope was impatient to do it. He pressed the Catholic nations to do it. They were afraid; they waited for a greater leadership than their own, and in the third year of this great struggle, one day when the telegraph bore over Europe the news of a great Southern victory, Pope Pius IX thought the opportune moment had come, and stepped forward and acknowledged Jefferson Davis in a grandiloquent address. He called him an illustrious man who had founded a nation, and he was happy to recognize him as the founder of that nation. Mark that, and just realize for a moment what it means. For twelve hundred years the pontiff of Catholic Christendom never did a public act like that without every nation (unless there was some peculiar interest involved) standing by his side. And doubtless the expectation of Pope Pius was, that these Catholic nations would step forward and follow his lead, but to his consternation not a nation in Europe followed him. God held them down. The Catholic nations on whose support he relied sat still, and he was left alone in his glory. The result was that he developed at once his weakness. When the public policy of Europe came to be settled, a short time ago, by the conference of Berlin, the Pope as a power was left out of all calculations; was asked to send no nuncio or representative, and civil and religious liberty was made an element in the convention formed by the representatives of those powers, including the czar and the sultan.

Now comes the fifth, the ultimate victory of civil and religious freedom. The hierarchy had done its worst, and Pope Pius IX had done his best, but for an infallible man he never made a greater mistake. Lee surrendered, Jefferson Davis was captured, the Confederacy collapsed. I merely refer to these as facts to trace out the evangelical results. William H. Seward's hand ached for once to write a certain note, but he could not do it until these events transpired; and men north and south, east and west, to-day bless God that the opportunity was given him to write that note. He took up his pen, and on a sheet of paper, not larger than this I hold in my hand, our secretary of state informed his imperial majesty that the patience of the American people was exhausted by the presence of foreign troops in Mexico, and he appealed to the emperor by all the respect that was entertained by France and this country for each other, and the traditional friendship for France, and France for the United States, to relieve the condition of the public mind in this country by ordering the evacuation of Mexico, because the Monroe doctrine was dear to the hearts of the people of this country, and they felt oppressed at its violation. When the French emperor took up that document he knew what it meant; he knew that that sheet of paper covered three hundred thousand armed men, he knew what the maneuvering of our fleet down towards New Orleans meant, and what General Sheridan's sealed commission, as he went around the coast there, and communicated with certain parties,—he knew what that meant. He was well aware that those three hundred thousand men, flushed with victory, were, every man of them, ready to step over the Rio Grande, and help out his soldiers, and would have done it. Hence he determined to evacuate Mexico. There was not merely the moral influence of the United States, but there was the fact that the chambers, and the press, and the people of France were crying out against the tremendous debt that was being heaped up. But as soon as the Princess Carlotta heard of the writing of Seward's note, she started for Paris in a French frigate, and on her knees before the Emperor Napoleon, knowing the risks the evacuation would leave her husband in, she besought him to refuse to accede to the secretary's demand, and to maintain the *statu quo* in Mexico. Eugenie lent her aid, and those two ladies plead with the French emperor to disregard the moral influence brought to bear by this nation. He told them that it was impossible; that war with the United States would be the result, and his throne would be compromised, and his people would not justify it. He said: "I have to do just exactly as intimated. I have ordered Marshal Bazaine to vacate the republic of Mexico, and to induce Maximilian to come away with him." Those words cost Carlotta her reason. She became from that hour a maniac.

Well, my friends, the fiat had gone forth. Bazaine advised Maximilian to leave. The clergy of the Church of Rome advised him to stand fast. He hesitated. An effort was made by the clerical party, and Austria was addressed. And hoping that the United States government would take no notice of it, a volunteer legion was enlisted in Austria to come to the assistance of Maximilian when the French had left the country. Seward took his pen again, and he told the emperor of Austria through the United States Embassador that when the first squad of those volunteers left Vienna, the American Minister should demand his passports and leave the country. That was the end of that intervention. The result was, that not a man left Austria to sustain Maximilian; and the liberal party in Mexico were left to fight it out, and without a shot being fired on our part, or an American soldier crossing the line. Maximilian unsustained, and only upheld by the church party, fought it out, and on the 14th of May, 1867, surrendered; but before that was done he had lent himself to advice that involved his

own doom. Bazaine and the French passed away. The brother of Maximilian had a frigate at Vera Cruz. Maximilian, deserted by those who had supported him, at last took advice of his fears, and was about to pass on to Vera Cruz, when the telegraph informed him that the French consul general had refused to allow his baggage to go aboard of the frigate. He was surprised, and did not understand what it meant. It was the influence of the Catholic Church, and two days afterwards he was informed that fifteen million more dollars had been collected, and thirty thousand more men enlisted, and if he only would come back and make one more struggle, the empire could be re-established. In an evil hour he lent his ear to those counsels, and returned to Mexico, but returned to his doom. He made a cabinet on his arrival, two members of which were clericals, and entirely under the clerical influence, and called to the chief command of his armies, the worst man, perhaps, in Mexico, a man called Marquize. The commander-in-chief directed a certain decree to be passed. That decree was passed on the second day of October, 1866. It invested the commander-in-chief with authority, such as, perhaps, never was put into the hands of any public functionary before. It was intended to terrify the people of Mexico into submission to a monarchical rule. It consisted of three short sentences. The substance was, that after a certain date, only eleven days ahead, every man found in arms against the empire should be treated as a brigand or a public robber, and shot at sight; that no appeal for mercy was to be forwarded to headquarters, no distinction made, and no record, except the record of conviction. I have lived in lands where despotism prevailed, yet, I will venture to say, that the terms of that black decree never were equalled by any edict of any of the tyrants who have ruled in this world. They have granted at least the honors of war to the captured enemy. But Maximilian determined that absolute cessation of all resistance should be no relief for a republican from the pain of death. How little he knew the day he signed it, of the use that would be made of it, and that during the next five months the best blood of the people should be spilled as a result. After having done this, Maximilian headed his army to fight for his empire, and, as I have already stated, surrendered on the 14th of May, 1867. There was treachery in the surrender on the part of Lopez, one of his most earnest friends perhaps done, for the purpose of stopping the effusion of blood. At all events, Maximilian was captured. He was tried by a court-martial, and condemned to die. From the 14th day of May, the day on which he surrendered, until the 19th of June, the day on which he died, Maximilian had every opportunity, during that month and five days, for his own defense. He chose the father of the Mexican bar and his associate to defend him. A long trial with every opportunity of a defense was given him, but the court-martial decreed he should die, and the president confirmed the sentence. I have been frequently asked since I returned what was the reason they condemned Maximilian, and why it was deemed necessary that his blood should be shed. The reasons, as given at the trial, are these: First of all, the judge advocate general, who was conducting the case against him, showed that a deputation of the citizens of Mexico had been sent by the constitutional president, Juarez, to warn the archduke of the danger which he would incur by coming to Mexico, and he was told that if he should yield to the advice of the hierarchy, and establish by force a government in Mexico, he would be subject to the penalty of death. Secondly—The infallibility of his consecration was made a particular point. The judge advocate said: "Gentlemen, the prisoner at the bar represents the only legitimate government that the Catholic conscience can obey. The pontiff of christendom consecrated him for his work, originated the empire, promised him in the name of heaven prosperity in the effort, and perpetuity in his dynasty, and as long as he lives, no lawful government that the Catholic Church recognizes can exist, and nothing but his blood can wipe out his claims, and allow a legitimate government to exist in this land. We demand his death." Yes, when Pius IX put his hands upon him and made that extraordinary promise that heaven had raised him up for this work, and that he was authorized by Almighty God as his vicar and representative on earth to promise him success and perpetuity—for an infallible man, it was a great mistake, and he lived to realize it.

The third consideration was that black decree; and when the advocate general named those grand men who had fled like common villains under that decree, he thrilled the whole court. And when he asked them: "Shall that man who gave no mercy to others find mercy at your hands? or shall he receive the doom that he so justly deserves?" they responded by condemning him to die, and on the 19th day of June, 1867, Maximilian stood up under the walls of the city and took his death from a Mexican bullet. His body was embalmed, and afterward was given to the Austrian admiral, at the request of Maximilian's brother, and was taken to Europe for burial in the tomb of his parents.

Now, friends, we have reached the sixth point. Men had done their utmost, and it was now time for God to work. And here is one of the retributions of history. I know the delicacy of attempting to show where God's hand is seen, but I will give you the facts and you can judge for yourself. God says, "Vengeance is mine, and I will repay," and that he taketh the wise in their own craftiness. Now, here was one of the most powerful combinations that the world had ever witnessed—France, Austria, the Papal court, and the hierarchy of Mexico in concert to crush out the life of liberty in a few poor, undrilled and unarmed men, who had modelled their constitution upon our own, and desired to be free like us. And unlikely was it, that two great empires, and the influence of the Pontifical court, and all the power of the wealth and personality of the hierarchy of Mexico could be defeated by these few patriots. And yet so it was. They were defeated because God was on the side of the oppressed. There were seven parties to this conspiracy against human freedom, and against the evangelical power of these United States of North America, and I ask your attention to what God did to these seven parties. First of all, let me mention that there was the Pope, the prime mover of the whole enterprise, and in whose behalf and interest all this was to be done; there was the Austrian court, supplying the brains to rule and the gold to establish it; there was the French emperor, whose legions went to put him by force upon the throne; there was Eugenie, wielding her powerful influence over her husband, and urging him to that work as she did to the work of the Franco-Prussian war in 1870; and there was Maximilian; and last of all, the Jesuits. Take the day Maximilian died, and the three years and eighteen days in which he reigned, and sweep the compass around, of which I speak now, and they all occurred within those limits. Probably retributive justice never crowded so much into such a space as in this case.

First of all, the Pope. I have taken great care to bring these dates to bear, but I will not mention them all. It will be an interesting historical exercise, as you trace the hand of God in history, at your leisure, to look at those dates, as I mention some of them. How many weeks after the death of Maximilian did Garibaldi and his followers begin to thunder at the gates of Rome, and would not be denied? The pontifical troops within offered resistance, but at last, the pressure became tremendous, and the Pope feared, if the assault was given, and men in the city of Rome fell, the responsibility would be his, and his very justly. They told me in Rome, as they showed me the walls, when the bom-

barding was over, and the breach was made, and the assault was about to be given, a colporter having a pack of Italian Bibles and Testaments on his back was in Garibaldi's army. He had reasons to think that he knew the circumstances within those walls better than the commanding general, and as soon as the command was given to cease firing, he did not wait for an order, but away he went. He tumbled through that breach, down into the ditch, picked himself up, and found himself among friends, and they said in twenty minutes he had sold every Bible and Testament in his pack, and could have sold twice as many if he had had them. That hour that saw those events, saw the crown of twelve hundred years drop from the temples of the pontiff into the dust, never to rise again. He suddenly and sulkily passed back and took his position in the Vatican, and out of the window of the Vatican he has declared from that day to this that he is a prisoner. A constitutional king of Italy now reigns in Rome, and maintains the civil and religious liberty that the Pope intended should be trampled out in Mexico. That was God's answer to him. Secondly, Austria's defeat. How did God deal with that despotic power, the main stay of Europe for such a length of time? Let me just state to you the facts. In 1864, while his brother was building his throne in Mexico, Francis Joseph was compelled by public sentiment to allow synodical action to the Evangelical Church in Hungary. Secondly, he had to surrender the Italian provinces, including Venetia, and pay forty millions of war indemnity, and in 1866 Austria beheld for the first time in the history of Catholic Europe, an evangelical man prime leader of their empire. Overthrown completely on the 22d day of May, twenty-eight days before Maximilian was executed, the papal concordat of Austria was flung overboard by that protestant statesman, and the emperor came forward, and proclaimed civil and religious freedom, and backed it up by a speech before the Chambers that was worthy of a man that loved liberty. That is how God dealt with the papal power in Austria. It had either to surrender to the will of heaven, or the stone would roll back and grind it to powder.

Now, I come to Napoleon, the third party to the conspiracy, and the worst. How did God deal with him? Influenced by his wife, who had the temerity to lift her finger and say, when the Emperor William turned his back at Ems upon the French ambassador, who had insulted him—Eugenie used these words: "This is my war." Well, the little finger is a small object, but it threw a shadow, and how little did that infatuated woman, the tool of the papacy, in this respect, not merely giving her influence to establish ecclesiastical despotism in Mexico, but to humble the permanent power of Protestantism on the continent of Europe—how little she knew that that shadow would cover herself, her husband, and her dynasty, and sacrifice crown, kingdom, and influence over others. Well, you know the result. Napoleon surrendered ten thousand cannon, four hundred and fifty thousand prisoners, two thousand millions of dollars of indemnity, and the grandest royal protestant of Europe was proclaimed emperor of Germany. And Napoleon, a prisoner in his hands, passed by permission of his conqueror, to Chiselhurst, where he ended his days in oblivion and sorrow. And what of Eugenie? We speak gently of this woman, but can it be without a purpose that she was wandering a few days ago through the bushes of Zululand, looking for the little monument of a rude character, erected by English soldiers over the green grass that drank the last blood of the dynasty of the Napoleons. And she a widow and an exile in a foreign land, dependent upon the hospitality of England, to find a home in her old age. Maximilian surrendered his life, Carlotta gave up her reason; and now I come to speak in the seventh place of the Jesuits, and the punishments meted out to those enemies of human liberty. I was in Mexico when the decree was passed to expel the Jesuits under the authority of the law, with a very offensive title, "the bill for the expulsion of pernicious foreigners." Well, a bill was passed by congress, that on a certain day every Jesuit in Mexico was to repair to the platform of the railroad company to take his departure, and I went to see them off. It was wonderful to see those men with their shaven crowns stand there on that platform with the representative of the government ready to bow them out of Mexico. Well, they went, and the *Monitor*, a leading newspaper, came out the following morning in an article about as energetic as anything I ever read. It was headed, "Jesuits, farewell," and the veteran editor, whom I personally know, wielded his pen with a force and energy that will never be forgotten. He ran up a bill of charges against that order, of the wrongs that they had inflicted on the country, and said to them: "This land you have misruled, and crushed, and whose life you have almost sacrificed, spews you out at last." And he closed with these words, words that Americans ought to remember. He says: "Jesuits, farewell. You are never to return, and in this hour of your departure we must say this: We have compassion, but that compassion is not for you. We reserve our compassion for the people among whom you will fix your future home, and with whose religious liberties you will attempt to tamper, as you have with ours."

What they did in New Mexico in eighteen months, you know just as well as I do. And now, from being the most Catholic of all Roman Catholic lands, formerly the most priest-ridden country on earth, to-day Mexico has not a monastery, a monk, a nunnery, nor a nun, a sister of charity, nor a Jesuit in all her bounds. [Applause.] A Mexican gentleman has said to me: "Let us not be misunderstood. We did not do this because we were opposed to the Christian religion, but we understand by bitter experience, that these confraternities, and even sisterhoods of the Catholic Church were not altogether religious in their objects. They were working in the interests of a foreign despotism. We can do without them, and our precious liberties have cost us too dear a price in treasure and in blood to allow us to permit any risks of those privileges at their hands, and therefore we have expelled them." Three weeks after the death of the emperor, President Juarez came back to Mexico, and never was there an ovation on this continent, outside of this country, like that which awaited him at the capital of the land from which for three years and more, he had been an exile. He came to the national palace. The flag of republicanism floated from the flag-staff on the summit, and that magnificent plazza was filled by tens of thousands of people who hailed it; and amid the salvos of artillery they sang the anthems of the free. They had maintained their liberty. They went to undo what had been done. They disestablished the Catholic Church, giving them as many places of worship as the wants of the existing congregation required. They told the representative clergy that they were henceforth to support themselves, and that the rest of the vast property that they had by unjust and improper means acquired, would be utilized to pay the debt caused by the war which they had forced upon them against freedom, that they would pay that debt by the sale of their property, and they have done it. [Applause.] The constitution has been sustained, and religious liberty maintained in the country. They point to us and they say: "Look at their protestant missionaries, their chapels, their schools, and their orphanages, and their training establishments." They point to us as illustrations of the religious liberty that has come at last to their country. Now, friends, remember that Mexico is only one of seventeen states and nations, but she is the largest of them all, and with the exception of Brazil, every one of those states and nations speak her language, the Spanish tongue. They all look to her as a leader, and will follow where she leads, and I have no doubt before some of you go down to the grave, the men raised up by the evangelical missions of Mexico, will be sending south their missionaries for the salvation of the states of Central and South America.

THE HOPE OF THE GLORY OF GOD.

The love of glory is natural and universal in mankind. It is not merely the weakness or vice of a few whom ambition moves "to wade through slaughter to a throne, or shut the gates of mercy on mankind." It is in one form or other a desire of all. Nor is it a wrong or sinful passion in itself, but only when indulged to excess or in a wrong way. It becomes a vice when glory is wrongly estimated or unduly prized; when men seek mere notoriety instead of true honor, or when they covet the praise of the unthinking or worthless because they may be many or great, instead of the approval of the wise and good; or when they desire to be honored for what is not theirs, or is not truly honorable. To desire that our name may not be forgotten, but remembered with praise and gratitude, that our memory should be cherished and our deeds recorded with the approbation of others, is no more than natural; it is just one of the many proofs afforded by human nature that man is not self-sufficient for his own happiness, but must enjoy the approval and love of others, and that he was made not for time only, but for eternity—not for the world, but for God. But the only true glory is the praise which comes from the wise and good, and which is not founded on any false or deceptive appearance, but on the truth. Hence the truest glory of all is that which comes from God alone, the approval and praise of Him who searches the heart, and whose judgment is ever according to truth. This is the only thing that can really and fully satisfy the longing for glory that is natural to the human heart. This, therefore, is the highest ideal and pattern of true glory. This is that glory and honor which is to be bestowed at the great day of judgment on every one that doeth good.

But how can we have any hope of this glory of God? Have we not all sinned and come short of the glory of God? And even now are we not continually failing in duty? Even our good works are not such as God can approve or praise. Are our love to Him and zeal in His service so sincere and strong that we could present them to Him and ask His approval? Is our discharge of duty so diligent and faithful that we can expect His praise? Is our love to our brethren so pure and fervent as to be a fitting object of his glory? In all these graces and duties is there any on which we can ourselves look with complacency and self-approval? Can we forget the vanity, the meanness, the selfishness that taints our best works? Can we fail to remember how often we fall short of our duty, how soon we grow weary in well-doing, how readily we give way to temptation? What hope can there be for us of the approbation of God when we so utterly fail to gain any approbation from ourselves? Must not the utmost we can expect be that we shall barely escape God's wrath and condemnation? Can we venture to hope for more than a mere acquittal at God's judgment, and this only for the sake of Christ? Can it be either possible or lawful for us to cherish any further hope? Yes, undoubtedly it is; for the Bible often speaks of the crown of glory which the Lord, the righteous Judge, shall give to His saints on the great day, and even of different degrees of reward for different services; and we are encouraged to rejoice in hope of the glory of God. But it is only those who are justified by faith, and stand in the favor of God now, that can have this hope. We must first have our sins forgiven of God's free grace for Christ's sake, and ourselves made accepted in the Beloved, before we can hope for the glory of God. But when those things are secured there is a firm foundation laid for such a hope. For the same Saviour in whom we have peace with God is also in us the hope of glory. Through Him not only are we received personally into God's favor, but the works also that we do here are accepted, and approved, and rewarded for His sake.

If we are Christ's indeed, we are His followers in this world—His followers in this as well as in other respects, that we, like Him, have a work given us to do—a work which, like His, is not our own, but our Father's; yea, a work which is the very same as He had to do—the work of obedience, of maintaining a holy and godly walk, of contending against sin and temptation and witnessing for truth in the world, of carrying forward the cause for which He lived and died. We have, indeed, the very same work to do as He had; for has He not said to His first disciples, and through them to us all, "As the Father hath sent me, even so send I you?" So, too, we may have, like Him, not only work to do, but trial and suffering to bear; for He said also, "If any man will come after me, let him deny himself, and take up his cross and follow me." But if indeed no less than this be our high calling, how shall we ever be able to fulfil it? Truly, did it lie with ourselves, by our own power of goodness to do such a work, we might well faint under it, or give it up in despair. But we are not called to go on this warfare at our own charge; it is only as having been united to Christ, and thus in Him accepted, that we are called to engage in it; and, by abiding in Him, and receiving out of His fulness, we shall be enabled to do it. Then, if we are really one with Christ in our work, we shall be one with Him in the reward of it too; and that reward is the glory of God. If we see to it that it is His work that we are doing, and that we are doing it by faith in Him, He will see to it that we are with Him in the glory which He has received of the Father as His reward.

Thus in Christ there is restored to us what sin has robbed us of—the hope of the glory of God. In Christ there is for us, weak, wayward, unfaithful as we are, led astray by folly and falling before temptation, now murmuring at the difficulty of the way and anon vainly conceited of our own strength—even for us, such as we painfully feel ourselves to be, there is a possibility and a hope of so performing the work given to us to do, as to receive at last the gracious approval: "Well done, good and faithful servant." It does seem strange, when we think of the weakness of our purposes, the faultiness of our doings; it may well seem passing strange, when we think of ourselves at all; but when we remember that it is God who worketh in us, both to will and to do, we cease to wonder, save at the surpassing grace of the whole way of salvation. For we see that even when the good works of the saints are rewarded with the glory of God, not a shadow is cast on the freeness of His grace; for still it is but His own gifts that He crowns in them; while they cast these their crowns before Him that sitteth on the throne, saying, "Thou art worthy, O Lord, to receive glory, and honor, and power."

In such a hope we may well rejoice. The manner and measure of the joy it should inspire is best estimated by the value of that glory that is hoped for, which, indeed, is far higher than anything else we can imagine. The raise or approbation of God has every quality fitted to make glory an object of desire, with nothing that could diminish its value. The worth of any one's approbation depends first and chiefly on his character. It is nothing worthy a man's joy or desire to be praised by the ignorant or worthless: such praise is no real honor. But to be praised by the wise and good—by those who are themselves justly praised— that is rightly deemed an honorable thing, fitted to rouse a man's ambition, and if attained, to send a thrill of joy through his frame. But if so, what praise of the wisest and best of men can for a moment be compared with the praise of God—the only wise and the only good—the glory that comes from Him who is all-glorious?

Again, the value of men's praise depends on their judgment and equity in bestowing it. There are some who lavish approbation very profusely, and praise at random without much discrimination or carefully weighing their language, while others are more cautious and judicious, bestowing praise only when it is really deserved, and in proportion to the degree of merit in each case. This is by far the more valuable kind of praise; a single word from one of this stamp being worth whole panegyrics from another who is lavish and indiscriminate in praise But what praise can have this value like that of God, the true and righteous one who, without respect of persons, judgeth according to every man's work? Praise from men also derives a value from the knowledge they have of our character and conduct. How often is the delight we might derive from the approval of others embittered by the thought, that did they but know us as we do ourselves, their high opinion would be abated and their praise become faint or be turned into blame. But no such feeling poisons the sweetness of the praise of God; for He who searches the hearts and sees our inmost thoughts and desires, knows us far better than we do ourselves.

Such a joyful hope will move us to increased zeal and efforts to make progress in the Christian life, and forgetting the things that are behind to reach forth to those that are before, and to press toward the mark for the prize of the high calling of God in Christ, the glory of God. It will keep us from supposing that when we have believed in Christ all is done, and we may spend our time in listlessness, selfishly bent only on securing our own safety. For surely, with such a hope before us, ours will be a higher and a nobler aim. We shall seek, as a thing to be prized above all else, the praise of Him who has loved and saved us. We shall not count it humility to be content with the very lowest place in the kingdom of God, desiring just to be barely safe within it. We shall covet earnestly the best gifts, and seek to do the work, and promote the kingdom, and win the praise of Him who has given His Son for us; that by patient continuance in well-doing we may obtain a most glorious crown to cast at his feet, and a fuller enjoyment of Him to all eternity.

10x1—10.

CHAUTAUQUA DIVISION OF

LOOK UP LEGION.

MOTTOES.

Look up and not down;
Look forward and not back;
Look out and not in,
And lend a hand.

PLEDGE.

We, the undersigned, wish to be manly (or womanly) and Christian in our character, and we therefore pledge ourselves to be as far as we are able, truthful, unselfish, cheerful, hopeful, and helpful, to use our influence always for the right, and never fear to show our colors. We also pledge ourselves to use our voice and our influence against intemperance, the use of vulgar or profane language, the use of tobacco, affectation in dress or manner, disrespect to the old, ill treatment of the young or unfortunate, and cruelty to animals.

We will aid and support each other in carrying out this pledge and the spirit of our mottoes.

Address all letters to Mary A. Lathbury, Orange, New Jersey.

SUMMER again! The months, like Mercury, must have winged feet to run the race of the round year so soon! June—July—August, and then, as Chautauqua Division of Look Up Legion, we shall celebrate our first birthday, though the Legion itself is seven years old.

How the lists have been lengthening! Six or eight hundred have enrolled themselves under the Island Park Division in the northwest, and new chapters are reporting weekly from different states. But we do not receive reports from all. While we have a large number of complete lists, we also have dozens of letters stating that a club or chapter is being organized, and no reports, as yet, of membership. And as this is our last opportunity to reach you through the CHAUTAUQUAN for the present we make a definite call to all chapters of the Legion:

ATTENTION!

August 10, 1881, is announced as the day of the annual reception of Look Up Legion, at Chautauqua. There will be a grand review at that time, and it is very desirable that reports should be sent in from all chapters or clubs, however small, that the growth of the division during the year may be certainly known. Many organizations which have reported during the past months may have added to their numbers, and so we make this request of all:—

Let each club or chapter send to us before July 1st a postal card bearing the name of the society, when organized, names of officers, and number of members up to date. Names of members not required, as we find that it will be impossible to make room for them in the CHAUTAUQUAN, though we shall be pleased to have them to include in the general roll. Let us have a response from secretaries all along the line.

THERE are three chapters of the Look Up Legion in Wheeling, W. Va. A member of one of them writes: "The first article of our constitution reads as follows: 'The object of this society shall be to do all the good it can, and in every way that it can;' and every member seems to try to carry out both the letter and the spirit of this article, as well as the balance of the constitution."

There are also three chapters of the Legion in Philadelphia. Of the one first established the Rev. N. I. Ruleinkam writes: "Our society is doing well, and the principles of the pledge are working like leaven on the characters of the young."

There are three chapters in Cleveland, Ohio, and three in Oakland, California, though the existence of more than one organization in a city or town is unusual.

Two clubs were formed about the same time—one in Cambridge, Mass., and the other in a California mining camp,—the opposite poles of the social world.

FOR the benefit of some who did not see earlier numbers of the CHAUTAUQUAN, we give information concerning the "helps" in forming societies. We quote from the circular: "Members of the Look Up Legion are advised to wear the badge, or 'Cross of the Legion.' It is a Maltese cross of nickel-plate, bearing the four mottoes and the monogram of the Legion. The price is fifteen cents. The pledge cards are by all means a desirable requisite. They are the size of a large envelope, beautifully illuminated, and bear the mottoes, the pledge and the cross. Price three cents." The Look Up Legion circular will be sent to any who desire it.

WE hope that in all cases where it is possible there may be delegates from the different chapters of the Look Up Legion at the Chautauqua meeting. We shall expect verbal reports from some of our leading chapters.

EDITOR'S OUTLOOK.

WHEN the C. L. S. C. was organized in St. Paul's Grove at Chautauqua, in August, 1878, the plan announced for local circles was very simple. Indeed it was left to the option of each member whether he would be connected with a local circle or not. This rule has never been changed. If an individual sends his name and fee of fifty cents to Dr. Vincent at Plainfield, N. J., he becomes a member of the C. L. S. C., and by pursuing the course of study, which covers four years, and making his annual reports on blanks that will be furnished, he may graduate and receive his diploma. Local circles have gained recognition on the principle that we are social beings, and whatever work we do, is done, if practicable, while enjoying the company of other people. Like Topsy—the local circle "growed;" it never was ordered from headquarters.

It may be composed of two or three persons who live in the same house or neighborhood. In one community it is a flourishing organization of twenty-five, in another fifty, and in still another a hundred or more members. It is officered by a president, secretary, and all the other titled workers common to a literary society. But it is not essential to membership in the C. L. S. C. that the individual be identified with a local circle. Hundreds, if not thousands of members are reading the course of study, who have never united with one. The largest liberty is granted to the individual member. Local circles are left to regulate themselves as to their constitution and by-laws and the character of their meetings even on "Memorial Days." In some places they hold monthly meetings for a critical review of their reading, a course of lectures is given on popular themes or on the course of study, in other places a social entertainment or an occasional concert popularizes the local organization. Where many members live in close proximity the local circle becomes a bond of union, by affording the members opportunities to cross denominational and other sharply drawn lines of distinction in society. It furnishes inspiration to the student, and to many members it becomes a positive help in doing their work. Notwithstanding all the advantages to be gained by coming in contact with one another, it should be remembered that the *real work* to be done by each member is *reading the course of study when alone.* To get out of the books the things set forth by the writers; to gather ideas concerning events and nations, religion and churches, individuals and society; in a word, to read with a purpose and accomplish it, should be the goal towards which every member of the C. L. S. C. should bend his energies. Self-culture is a task, but it may be performed if the student is diligent and industrious. Our membership in the C. L. S. C., and in the local circle, makes the scaffolding upon which we stand. The books we use are our tools, and the culture and knowledge we gain make our reward.

No books in the course are above the capacity of the average reader. There is no Hebrew, Greek, Latin, German nor French, but it is just what the name indicates, a "Literary and Scientific" course of study. In the books selected we get much in little—the kernels of truth, as they have been found in history, nature and revelation, by the foremost thinkers of our own and earlier times. If local circles aid the members to get a correct understanding of what they are reading and help them to master the course, then we advise their use, otherwise we would hesitate. Where they impose onerous tasks, such as the preparation of essays, or delivering declamations, on timid and inexperienced members, so that they are discouraged and frightened, and abandon the course of study, we think they are not helpful to this class of students, and such should either withdraw and study alone, or make an arrangement with the committee to excuse them from public efforts. In order to secure the highest degree of prosperity the local circle should grant as large liberty to its members as the general circle does. Thus it will make a happy family.

PEOPLE travel for various purposes: some for health, some for pleasure, some for observation and study, some to spend their time, and some only because others travel. Some go through a country and see nothing, some look only at their guide-book, and some go open-eyed. Frequently the passage through a country is so rapid that the soul can gather little as it flies. There are great differences in the amount of benefit received by different travelers. The benefits of travel are several. *Travel is restful.* Relief from continuous labors is sometimes a necessity to save life, and is with every man once or twice at least in his life a most grateful change. His mind is still occupied, but with other thoughts, other incidents, other scenery; his heart is stirred with new emotions, he begins to live again.

Travel is healthful. A change of climate has sometimes wrought wonders—not perhaps so much because of the climate itself, as because of the relief of the mind from cares, change in kind of exercise, and the awakening of pleasant emotions. A year spent in travel will sometimes add ten years to the life. Sea voyages are frequently recommended for certain constitutions and physical conditions. *Travel is pleasant.* The past is revived. Scenes of old live again, battles are fought, kingdoms won. We live over all the past. History is thus fixed in the memory. We know a country when we have seen it. Reverence is increased by visiting sacred spots. We think more of the literary productions of great minds when we have seen their homes and knelt by their graves. Valuable acquaintances are formed. The mind is stored with thoughts and pictures which will ever afford pleasant recollections. The man of travel has a fund of various knowledge for conversation. *Travel is a good school.* The anthropologist may study man; the philologist, language; the politician, society and government; the philanthropist, crime and its attempted cures; the historian, lands and peoples; the student, libraries and universities; the naturalist, all revelations of nature; and so on. What is seen is known. The old country furnishes the places of world-wide interest—living cities, London, Paris, Berlin, Rome, Athens—dead cities, the catacombs, Herculaneum, Troy, Babylon, Nineveh—mighty Oriental nations, India, China, Japan—countries celebrated in Bible history, Palestine, Egypt, Greece, Italy, Babylonia—wonderful natural scenery, the Giant's Causeway, the Alps, the *Mer de glace*—the old country has also made the world's history. Americans long to go abroad. They feel that when abroad they are seeing new things, *traveling.* American natural scenery, however, is unrivaled. The mightiest rivers, the widest plains, the most wonderful water-falls, vast caves, exhibitions of geologic convulsions, great forests, mountain scenery, lakes, Yosemite—these may well challenge comparison with anything of the kind in the old world. America also has a history. It is unwritten but yet indicated, however inadequately, in aboriginal relics scattered all over the continent. We have also our living cities, our growing, our live cities; our dead cities, too: Copun, Uxmal, Palenque, and many others which are slowly being disentangled from the almost impenetrable forests of Mexico and Central America, and disclosed to the wondering gaze of the explorer. Travel by all means if you can, but do not forget that there is an America worth seeing. We know scarcely half of our own Republic. Travel with open eyes, sympathizing hearts, much love of humanity, worshipful souls—you will not fail to receive a constant income of future satisfaction and comfort.

Summer resorts have become a necessity in modern life. The slow-paced method of business in vogue among our ancestors is a thing of the past. In these days of railroads, telegraphs, and telephones, everything is done with a rush, and the strain on business and professional men is much greater now than it was even a few years ago, and is constantly increasing. In the sphere of women's life in large cities the same condition of things obtains. A continual round of calls, entertainments, and such like, together with the perplexities coincident with the care of a family and household, constitute a perpetual and severe tax upon her energies, so that at the close of the season a woman of society is perhaps as much worn and fagged out as is her husband by the cares of the counting-room or by the arduous duties of his office; hence the need that both flee from the city to some friendly resort to obtain rest and recuperation.

What is thus a necessity to the jaded parents, becomes a priceless boon to the children, who for a short season at least are removed from the brick pavements, stifling air and impure odors which are the almost inevitable concomitants of city life, and are thus enabled to drink in the pure, stimulating air from ocean or mountains, and to enjoy the sights and sounds of country life.

The desire and necessity for repairing to summer resorts is not confined to the dwellers in large cities. Monotonous routine and continued application to work becomes tiresome and distasteful in any situation, and a short season passed in rest and recreation amidst changed surroundings, gives one new zest for daily duties. The practice so prevalent of late, and becoming more general on the part of all who can afford it, of spending a few weeks, or even months, at some place of resort, is not one of fashion and folly, but is dictated by both prudence and wisdom, and is productive of the most beneficial results. Lives are saved, health is restored, the spirits are reinvigorated, the mind is rested, under the recuperating influences of these seasons of rest.

In order to accommodate the many thousands who annually thus seek to recuperate their wasted energies, summer resorts have been multiplied all over the land. They are to be found by the ocean side, on mountain summits, by charming lakes, and in the seclusion of the country, in sufficient variety to suit the tastes and necessities of all.

None of these numerous resorts offer more attractions to those seeking rest and recreation than CHAUTAUQUA. It is easy of access from all parts of the country. The various lines of railroads leading to this famous spot vie with one another in cheapening the rates of transportation and caring for the comfort of their passengers. The scenery is delightful, the climate salubrious, and the lake is a gem of beauty, whose placid waters ripple with music at the touch of the boatman's oar. Visitors can live as they chose, either in hotels furnishing all the luxuries of the season, or in the pleasant, homelike cottages, or in Arcadian simplicity in a snowy tent, pitched in the quiet groves, or by the pebbly shore of the adjacent lake, enjoying society or solitude according to their own liking. Lectures, concerts, and games combine to make the hours pass rapidly and profitably. We would be delighted if every reader of The Chautauquan could spend the ensuing season at Chautauqua, and we know that our delight would be more than equaled by their own.

The announcement of the death of Lord Beaconsfield has fixed the eye of the world still more intently upon the career and character of this remarkable man. Long ere his death had Benjamin Disraeli succeeded in drawing the attention of civilized mankind upon himself. It is not reasonable to hope that the present generation will be able to agree in estimating the character and motives of the mysterious man who for nearly fifty years has had so large a place in the world's affairs. For a long time he has been regarded as the sphinx of the nineteenth century, and certainly if inability on part of friend and foe alike to penetrate his breast entitles him to such a name it has not been misapplied. Having failed to read him in life it is more than probable that the mystery will remain now that he is dead.

Viewed in the light of the obstacles overcome, the varying fortunes experienced, and the high station which he finally reached, a more anomalous career cannot be found in history. In this country we have seen almost successively a rail-splitter, a tailor, a tanner and a canal-boy rise to the chief office of the government, but that one born seventy-seven years ago in the great city of London, of a long-despised and persecuted race, without a university education, should make his way, opposed by the ablest competitors, in spite of class distinctions and prejudices, to the chief power of the leading nation of Europe, is without a parallel. Some have denied to this man the possession of great abilities and genius, claiming that he owed his success to the trickster's cunning seconded by the whims of fortune. Could such a charge be sustained it would invalidate the claims of every man that has lived. Fortune follows no man a whole life; she plays him foul and casts him overboard as soon as he relies on her alone. But not more of his success in the career he had marked out is due to his rare abilities than to his industry and energy. He was an indefatigable worker, and quailed before no discouragement. Obstacles seemed only to intensify his zeal. Thrice defeated as a candidate for parliament in the very beginning of his political life, he returned to the struggle the fourth time with a determination invincible. The world is familiar with his famous declaration on the occasion of his maiden speech in the House of Commons, when laughed at and ridiculed and compelled to sit down, he told them that the time would come when they would hear him. Energy's twin-sister, industry, he knew, also, from early life. He who narrows down the measure of the work a man can do in this world can form no conception of this man's labor. It mattered not whether as leader guiding the policy of a political party, or as premier swaying the destinies of an empire, he surprised the world by sending forth from his pen volume after volume whose claim to merit will probably be as variously estimated as the author himself.

The death of Beaconsfield leaves vacant for the time a leading role in the play of European politics. His opponents have always believed him wanting the high motives and large conscientiousness of his great rival Gladstone. This is doubtless true, though it ought to be observed that with all the power he wielded it cannot be said that he ever was false to England or betrayed her interests, as he regarded them. At times in his career he reached beyond his party limits and got hold on the affections of the popular heart. One who was in London when he returned from the Berlin congress bringing his announcement of "peace with honor," will not soon forget the popular outburst of enthusiasm and joy that greeted him. Mr. Gladstone has moved in the House of Commons that a memorial in his honor be placed in Westminster Abbey.

THERE is a temperance movement now going on in the country, which has many elements of promise in it, and from which society may expect to hear good reports in the future. We refer to the "Women's National Christian Temperance Union." It is composed exclusively of women and numbers more than twenty-five thousand members, scattered all over the land. Their plan is to organize a "Union" in every town and city, to be composed of ladies from all the churches and no church, to hold "mothers' meetings" and "children's meetings" regularly, to tone up public sentiment on the temperance question, and arouse temperance men to prevent licenses being granted in those states where a license law exists, and to secure the enforcement of the prohibitory law in states where such a law has been adopted. Another excellent feature of their work is that they are thrusting out into the field to lecture some of the best platform and pulpit talent to be found among the women of our own country and Canada: Miss Frances E. Willard, who has recently made a tour of the southern states, "Queen of the Platform," as a Cincinnati paper styles her, and president of the National Union; Mrs. Youmans, of Canada; Mrs. Woodbridge, of Ohio; Mrs. Wittenmyer, of Philadelphia; and Mrs. Hunt, of Boston, Mass., with many others.

Mrs. Hunt is doing a special work, and on an entirely new line for this reform. She has two books, one written by Dr. Richardson, of England, on "Alcohol and its effects on the brain, blood, and tissue." This she aims to get into the course of study in colleges; by visiting college towns and addressing the faculty and students in her eloquent and persuasive manner, she usually succeeds. Eight colleges in Ohio have recently placed the book in their curriculum; among them is the Ohio Wesleyan University. The higher institutions of learning in every state she visits hear her gladly, and in nearly every instance the temperance text-book is adopted by the authorities. The other book, by Miss Coleman, is on "Alcohol and Hygiene." It was prepared for the children and youth in our common schools. Mrs. Hunt seeks a hearing from the school-board in every town she enters, for the purpose of converting them to her position. Then she brings her public lecture to bear upon this end, and the result is, in very many cases, that the book is introduced into the common schools. Her position is a strong one: prevention is better than cure. Teach children by the scientific method "that alcohol is a poison that should be shunned," and you arouse an intelligent prejudice against strong drink and the rum traffic, which in ten or fifteen years will revolutionize our social customs and temperance legislation. We believe Mrs. Hunt is right, and that her society is wise in keeping her in the field, and that it would do still better by sending out a troop of just such ladies to introduce these temperance text-books into the seminaries, academies, and common schools in all the states in the union.

EDITOR'S NOTE BOOK.

We send this month, to every subscriber of THE CHAUTAUQUAN, the advance copy of the CHAUTAUQUA ASSEMBLY HERALD. It contains the programme, with the latest and fullest information concerning the coming Assembly. Every member of the C. L. S. C. will be interested in the meetings to be held in August, hence we suggest, if you cannot attend the Assembly, subscribe for the ASSEMBLY DAILY HERALD. There will be nineteen numbers, which will contain detailed reports of all the meetings, together with nearly seventy lectures that will be delivered at the Chautauqua meetings. These lectures alone would make six volumes of the size that cost $1.25 each, yet in the ASSEMBLY HERALD they cost $1.00. We call the especial attention of members of the C. L. S. C. to our *combination* offer for the ASSEMBLY HERALD and THE CHAUTAUQUAN for 1881-1882.

It has come at last. A discussion in *The Christian Advocate* at New York on licensing and ordaining women as preachers; and to our surprise a woman, Mrs. Cynthia May, is the author of the article. We are amazed—not at the ability with which this lady presents her cause—but at the large liberty granted by this hitherto conservative church paper. This is free discussion indeed. The editor, Dr. Buckley, may be opposed to the ordination of women and object to granting them the ballot, but when he opens his columns to men and women and invites them to discuss this question, he disarms prejudice, and manifests a magnanimous spirit which will win for his paper hosts of friends. He invites believers in the reform to write on the subject. A committee of three, who believe in the ordination of women, will sit in judgment on the papers and the best one will be published. And this is the way we move toward the millennium. "So mote it be."

We paid a flying visit to Chicago recently, and looked in on Dr. Stowe, of the firm of Walden & Stowe. It was gratifying to find the Doctor bubbling over with progressive ideas concerning his publishing house, some of which he is putting into practice. We met our old friend, the Rev. Dr. Arthur Edwards, the radical and popular editor of the *Northwestern Advocate*. He is getting ready to visit England for three months, and declares that he will not go any farther than England, because right there the greatest battles of civilization have been fought. Messrs. Fairbanks & Palmer, who visit Chautauqua every year with their numerous Sunday-school publications, are making elaborate preparations for their annual visit in August next. We heard good reports from the C. L. S. C. in this great centre of the northwest, and from the large number of copies of THE CHAUTAUQUAN that go there, we judge that that is a strong and growing centre of the C. L. S. C.

Bishop H. W. Warren, of Atlanta, Ga., will be at Chautauqua from the opening of the meetings until the 6th of August, when he will sail from New York for England. He is doing a grand work in the south among the churches and in the schools, and with his pen in the religious papers. He has carried some of the practical ideas, which have made him a valuable adviser and lecturer at Chautauqua, into the Atlanta University, where he has organized a "College of Carpentry." The colored students take to it with enthusiasm. It is the utilitarian theory, educating them to handle a saw and plane, draw-knife and hammer, so that they may be able to improve the fences and private dwellings, school and church buildings wherever they go. The colored girls are being taught the domestic arts. This is the kind of education that will speedily elevate this race.

The season of the Assemblies is rapidly approaching, and they are multiplying in all parts of the land. The Island Park Assembly, on the shores of Sylvan Lake, near Rome City, Indiana; the Lakeside Assembly, at Lakeside, Ottawa county, Ohio; the Clear Lake Park Assembly, at Clear Lake, Iowa; Round Lake, New York state; Ocean Grove; Framingham Assembly, at South Framingham, Mass.; the Assembly at Monterey, California, and Chautauqua, the father of them all. It is a good omen, when we see these summer resorts springing up all over the land, consecrated to the study of the Scriptures, and aiming at a higher standard of Christian culture among teachers and officers in our Sunday-schools. We shall lay before our readers a report from every one of them, in the ASSEMBLY DAILY HERALD and THE CHAUTAUQUAN.

With this number of THE CHAUTAUQUAN we complete the publication of our part of the C. L. S. C. course of study for the current year, with one exception—there will be about ten pages of Dr. Wheatley's "History of the World" published in the July number. We had hoped to finish this month, but the Doctor gives "full measure, pressed down, shaken together, and running over." We shall help him where he "runs over." Members of the C. L. S. C. have reason to be gratified as they near the end of the year and look back at the symmetry, strength, and beauty of the course they have studied, and it is reasonable to presume that every one has a stronger, more beautiful and symmetrical character for having pursued the course.

Miss Belle McClintock, of Meadville, Pa., whose solos have charmed tens of thousands of people at Chautauqua, is permanently engaged as soprano in the Presbyterian church in Titusville, Pa., and her sister, Miss Louise McClintock, who has a fine voice under a high degree of cultivation, has been engaged, at a good salary, as the soprano in the Baptist church in Franklin, Pa. In these days, when so much of our best musical talent is easily purchased to serve in operas and theatres, the Misses McClintock are to be commended for placing their talents, which have made them famous all over the land, at the disposal of the church of God to sing sacred songs.

The Western Reserve Home Magazine is a new publication which has commenced its monthly visits to our table. The Rev. A. N. Craft, A. M., who is the editor, takes to his work naturally, and in this number displays the qualities of a good editor by making a good magazine. They are a reading people on the Western Reserve, and we bespeak for this periodical, which is pure and elevated in its tone, a large circulation.

The history of the Chautauqua Literary and Scientific Circle will be written by the general secretary, Mr. Albert M. Martin, of Pittsburgh. "He is worthy and well qualified."

Dr. Clark Whittier, of Toronto, Canada, with his wife and daughter, have commenced a tour of the world. In a letter to us, he says: "I am firm believer in the triumphant success of the C. L. S. C." He has subscribed for THE CHAUTAUQUAN and ASSEMBLY DAILY HERALD for 1881 and1882, and requests us to forward them to San Francisco, the Sandwich Islands, and South Australia. They will visit Japan, China and India. He continues: "I am a traveling agent of the C. L. S. C., self-appointed. Get paid in a sense, and expect to get home in season to read up the C. L. S. C. course for 1881 and 1882." *Bon voyage.*

The International Sunday-school Convention which will hold its sessions in Toronto, Ontario, from June 22d to 24th, promises to be a great gathering. Delegates from the United States and British American provinces have been appointed. Railroad accommodations and all preliminary arrangements are being perfected by Edward S. Wagoner, Esq., of Mechanicsburg, Pa. It will be a grand opportunity for most of the delegates from the United States to see Niagara Falls, visit the Queen's dominions, and clasp hands across national and denominational lines in the interests of a good cause.

A member of the class of '83 writes: "We have a small local circle of about twenty members. We appoint lessons and a questioner every week, and sometimes have a review or read something from THE CHAUTAUQUAN. Our meetings are very pleasant and profitable for we all learn more than we could reading alone, and it serves to make us better acquainted with one-another. We are studying the 'Art of speech' now and find it very interesting."

EDITOR'S TABLE.

Q. A friend in New Jersey asks: Would it not be a good idea to have published with the last number of THE CHAUTAUQUAN an *index*, not simply a *table of contents, but a full index.* This will of course cost you something; cannot that cost be made good by a tax of between ten and twenty-five cents on each one who desires the index?

A. A complete index to the first volume of THE CHAUTAUQUAN is now being made. It will appear in the July number without any additional expense to our subscribers.

Q. What are the leading features of the "Natural Method" of teaching languages? I am told that this is the method used at Chautauqua.

A. Chief among the characteristics of this method is its naturalness. It begins as nature begins and proceeds as nature proceeds. It ignores formal, technical grammar with its cumbrous rules and statements in the beginning, but solves principles and rules as the pupil advances and has need of them. It is an object-teaching method associating the name or word always with the thing, quality or action to which it is applied. It banishes the English language from the recitation room requiring the student to ask and answer all questions and comprehend explanations in the language studied. It enables the student to talk with ease and fluency, as well as to translate in a much shorter time than by any other method.

Q. What are the best works explaining the systems of short-hand called takigrafy and phonography, and where may they be obtained?

A. Before us lie not less than fifty inquiries of the above kind. They are evidence of the general desire for a substitute for the slow and laborious long-hand writing. That the best information may be obtained we refer all inquirers about phonography to Wm. D. Bridge, New Haven, Conn., who will have charge of the class in phonography at Chautauqua the coming summer. Any good short-hand writer will probably be able to give information as to books, etc., upon either phonography or takigrafy. The author of the system of takigrafy, Rev. D. P. Lindsley, we are informed, may be addressed at 37 Park Row, New York City.

Q. Which is the best German dictionary and what is the price of it?

A. Adler's is as good as any. That by Prof. Whitney, recently published, is also a good work. Either is a good working dictionary and adapted to the needs of the American student. The former can be had for about five dollars; the latter is a smaller work and costs one dollar less. There is also a smaller edition of Adler's, which is sold for two dollars and twenty-five cents.

Q. Will you please tell me in THE CHAUTAUQUAN whether a knowledge of phonography would be of any use to a lady as a means of support, and if so, in what way?

A. The ability to report well would be of use to a lady as a means of support. Good reporters often obtain positions with good salaries. There is a real demand for those who are competent. We know a young man who has paid his way through college by odd jobs of reporting through the year together with about four weeks steady work in the summer. There is nothing in the proprieties of life to exclude a lady from such work.

Q. Has anything ever been gained for the cause of temperance by legislation? Is such legislation right in principle?

A. (1) Yes. Notwithstanding the misstatements and falsifications which have been circulated concerning the working of prohibitory laws in the state of Maine, the truth is that the experience of this single state stands a demonstration of the efficacy of temperance legislation. Scores of instances may be cited where, under local option laws, saloons and bars have been banished resulting in the increased sobriety of communities. So far as we know attempts to prove the contrary arise from a lack of knowledge of the facts or from sympathy with the other side of this great moral and social question.

(2.) It is as right in principle as for the majority in society to enact that men shall not steal nor murder.

Q. Permit one who is a new member to ask when the C. L. S. C. was organized?

A. The C. L. S. C. was organized at the Assembly of 1878, nearly three years ago.

Q. Frequent allusions are made in the C. L. S. C. circulars I receive, to the opportunity to have affixed to our diplomas special seals as reward for special study. Do those who have pursued the *regular* course have no seal to their diplomas? and will any reading outside of that *named* as *special* entitle to any honorable mention or seal on the diplomas of regular C. L. S. C. graduates?

A. In answer to the above important question Dr. Vincent furnishes the following: "All diplomas that are issued by the C. L. S. C. will have on them the regular C. L. S. C. seal. Reading outside of that on given subjects will receive recognition under the laws of our "Circle" in the form of seals. If one reads up English Literature, for example, and covers as much ground in so doing as our own *special course* requires, it will be a very easy thing to arrange for the *special seal* of English Literature."

Q. Is it true that there are no flies, fleas, mosquitoes, spiders, and other troublesome insects at Chautauqua? If there are none, give the reason why.

A. We are almost prepared to affirm the above to be true. Certainly we do not now remember to have ever seen a fly, flea, spider, or mosquito at Chautauqua. There need be no doubt in the minds of our friends who contemplate a visit to Chautauqua that the above catalogue of pests exists there if at all in minimum quantities. Visitors hailing from regions afflicted with pestiferous insects may anticipate a season of special rest and peace. We know of no way to explain the absence of such creatures, unless it be that the disciplinary need of them does not exist at Chautauqua.

Q. A friend of mine, long addicted to the use of tobacco, says that when he resolved to quit the use of it, he asked God to take away the appetite, and that his prayer was immediately answered, to the effect that he has not felt the least craving or desire for it since. Do you think it probable that God would answer such a prayer in this way, or is the cure to be explained in some other way?

A. We do not think it probable. Yet it is not wise nor proper to presume to say what God will or will not do. It is not well to limit God nor to prescribe His action. He may answer the same prayer of two of His children very differently, but always for the highest good of each. We say we do not think it probable that God will take away the appetite for the asking because it does not seem to be in harmony with His methods of blessing and disciplining His children. He prefers to give us faith, and strength, and hope in the struggles of this life that we may triumph, but he does not step in and slay our enemy outright for us. Poor weakling soldiers we would be if he did. There is more hope for the reformed chewer or smoker who feels that God is saving him every day from the power of appetite and habit than for him who lies down at his ease, persuaded that in a moment God has wrought a miracle on his physical system. God gives us spiritual rather than physical healing in such things. Quite as consistently might a man ask God to take the rheumatism out of his joints, after having needlessly and foolishly exposed himself. That some persons have believed that such a miracle had been wrought upon them, may be explained as one would explain the fact that in times of great excitement or emotion a man may forget his hunger for days together. A man's whole nature may be so aroused, his soul may be so terribly in earnest against an appetite, that its power will not be felt, and if this intense purpose continue, the appetite, no longer indulged, under natural laws will pass away.

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